dynamic_portfolio_optimizer

February 2, 2026

[17]:
```
import yfinance as yf
import pandas as pd
import numpy as np
import os
from typing import List, Tuple

import seaborn as sns
import matplotlib.pyplot as plt
```

0.1 1. Initialization

0.1.1 1.1 Stock Setting

[18]:
```
FORECAST_HORIZON = 21
LOOKBACK = 66

ALPHA = 0.7 #weight of portfolio_return in PortfolioOptimizer

START_DATE = '2021-01-01'
END_DATE = '2026-01-30'
TICKERS = ['TSLA', 'HOOD', 'NVDA', 'AMZN', 'BE', 'GOOGL', 'ORCL', 'AAPL',␣
 ↪'QQQ', 'SPY']
```

0.1.2 1.2 load data, concat technical indicators

[19]:
```
class DataLoader:
    def __init__(self):
        self.tickers = TICKERS
        self.start_date = START_DATE
        self.end_date = END_DATE
        self.lookback = LOOKBACK
        self.forecast_horizon = FORECAST_HORIZON
        #store all the data in the folder
        self.data_dir = 'Project/data'
        if not os.path.exists(self.data_dir):
            os.makedirs(self.data_dir)

    def fetch_data(self, use_cache = True) -> pd.DataFrame:
```

```
        """Fetches historical data for all tickers, with caching."""
        cache_path = os.path.join(self.data_dir, 'raw_ticker_data.pkl')

        if use_cache and os.path.exists(cache_path):
            print(f"Loading data from cache: {cache_path}")
            df = pd.read_pickle(cache_path)
            if self.start_date:
                df = df[df.index >= self.start_date]
            if self.end_date:
                df = df[df.index <= self.end_date]

            #check if all tickers are present in the cached dataframe
            cached_ticker = df.columns.levels[0]

            missing_tickers = []
            removed_tickers = []
            for t in self.tickers:
                if t not in cached_ticker:
                    missing_tickers.append(t)
            for t in cached_ticker:
                if t not in self.tickers:
                    removed_tickers.append(t)

            if 'SPY' not in self.tickers and 'SPY' not in cached_ticker:
                missing_tickers.append('SPY')
                print("SPY is not in the dataset. Please add it to the ticker␣
↪list.")
            if not missing_tickers and not removed_tickers:
                return df
            if missing_tickers:
                print(f"Dataset missing tickers: {missing_tickers}.␣
↪Redownloading from Yahoo Finance...")
            if removed_tickers:
                print(f"Dataset contains tickers that are not in the ticker␣
↪list: {removed_tickers}. Removing from dataset...")

        print("Downloading data from Yahoo Finance...")
        data = yf.download(
            self.tickers,
            start=self.start_date,
            end=self.end_date,
            group_by='ticker',
            auto_adjust=True,
            progress=True
        )
        data.to_pickle(cache_path)
        return data
```

```
    def calculate_features(self, df: pd.DataFrame) -> pd.DataFrame:
        """Calculates features for each ticker."""

        processed_dfs = []

        #use sp500 for our basecase
        spy_data = df['SPY']['Close']
        spy_returns = np.log(spy_data / spy_data.shift(1))

        for ticker in self.tickers:
            t_data = df[ticker].copy()
            close = t_data['Close']
            volume = t_data['Volume']

            #1. Log Returns
            log_ret = np.log(close / close.shift(1))

            #2. Realized Volatility (LOOKBACK days rolling std * sqrt(252/
↪LOOKBACK))
            volatility = round(log_ret.rolling(window=self.lookback).std() * np.
↪sqrt(252 / self.lookback), 4)

            #3. EMA20 and EMA50
            ema_20 = close.ewm(span=20, adjust=False).mean()
            ema_50 = close.ewm(span=50, adjust=False).mean()

            #4. Beta (LOOKBACK-day rolling)
            #covariance of asset returns and spy returns
            rolling_cov = log_ret.rolling(window=self.lookback).cov(spy_returns)
            rolling_var = spy_returns.rolling(window=self.lookback).var()
            beta = round(rolling_cov / rolling_var, 4)

            #5. log volumn for volume consistency over different tickers
            log_vol = np.log(volume + 1e-8)

            #6. Stochastic Momentum Index (SMI)
            #standard settings: lookback (n)=10, first smooth (k)=5, second␣
↪smooth (d)=10
            n_period = 10
            k_period = 5
            d_period = 10

            #find highest high and lowest low over n_period
            hh = t_data['High'].rolling(window=n_period).max()
            ll = t_data['Low'].rolling(window=n_period).min()
```

```
            #calculate center of range and price relative to center
            midpoint = (hh + ll) / 2
            diff = t_data['Close'] - midpoint
            range_len = hh - ll

            #double ema smoothing
            #smooth the 'diff' (distance from midpoint)
            smooth1_diff = diff.ewm(span=k_period, adjust=False).mean()
            smooth2_diff = smooth1_diff.ewm(span=d_period, adjust=False).mean()

            #smooth the 'range_len' (total range)
            smooth1_range = range_len.ewm(span=k_period, adjust=False).mean()
            smooth2_range = smooth1_range.ewm(span=d_period, adjust=False).
↪mean()

            #calculate smi
            #avoid division by zero with small epsilon
            denom = (0.5 * smooth2_range) + 1e-8
            smi = 100 * (smooth2_diff / denom)

            #normalize smi to be roughly between -1 and 1 for the model, use␣
↪this as final SMI
            smi_normalized = smi / 100.0

            #6. Calculate multi-period cumulative returns
            rolling_return = log_ret.rolling(window=self.forecast_horizon).
↪sum().shift(-self.forecast_horizon)

            #assemble features
            features = pd.DataFrame({
                f'{ticker}_price': close,
                f'{ticker}_volume': volume,
                f'{ticker}_log_ret': log_ret,
                f'{ticker}_volatility': volatility,
                f'{ticker}_EMA20': ema_20,
                f'{ticker}_EMA50': ema_50,
                f'{ticker}_beta': beta,
                f'{ticker}_log_vol': log_vol,
                f'{ticker}_smi': smi_normalized,
                f'{ticker}_{self.forecast_horizon}_rolling_return':␣
↪rolling_return
            }, index=t_data.index)

            processed_dfs.append(features)

        #combine all features
        full_df = pd.concat(processed_dfs, axis=1)
```

```
        return full_df

    def create_tensors(self, feature_df: pd.DataFrame) -> Tuple[np.ndarray, np.
↪ndarray, List[str], pd.DatetimeIndex]:
        """
        Converts the feature DataFrame into 3D tensors and target vectors.
        Output: (y, X, dates)
        X shape: (# of samples [total_days - lookback], #of assest, lookback␣
↪windows, # of features)
        """
        feature_df = feature_df.dropna()
        assets = [t for t in TICKERS if t != 'SPY']
        feature_names = ['price', 'volume', 'log_ret', 'volatility', 'EMA20',␣
↪'EMA50', 'beta', 'log_vol', 'smi']

        dates = feature_df.index

        valid_indices = range(self.lookback, len(dates))

        X_all = []
        y_all = []
        valid_dates = []

        data_values = feature_df.values
        col_map = {name: i for i, name in enumerate(feature_df.columns)}

        for i in valid_indices:
            if i < self.lookback - 1:
                continue

            X_t = []
            y_t = []

            for asset in assets:
                asset_cols = [col_map[f'{asset}_{feat}'] for feat in␣
↪feature_names]
                target_return = col_map[f'{asset}_{self.
↪forecast_horizon}_rolling_return']

                start_row = i - self.lookback + 1
                end_row = i + 1

                seq = data_values[start_row:end_row, asset_cols]
                target = data_values[i, target_return]

                X_t.append(seq)
                y_t.append(target)
```

```
            X_all.append(np.array(X_t))
            y_all.append(np.array(y_t))
            valid_dates.append(dates[i])

        return np.array(X_all), np.array(y_all), assets, feature_names, pd.
↪DatetimeIndex(valid_dates)
```

[20]:
```
data = DataLoader()
df = data.fetch_data()
df = data.calculate_features(df)
```

```
Loading data from cache: Project/data/raw_ticker_data.pkl
```

[21]:
```
df
```

[21]:

Date	TSLA_price	TSLA_volume	TSLA_log_ret	TSLA_volatility	\
2021-01-04	243.256668	145914600	NaN	NaN	
2021-01-05	245.036667	96735600	0.007291	NaN	
2021-01-06	251.993332	134100000	0.027995	NaN	
2021-01-07	272.013336	154496700	0.076448	NaN	
2021-01-08	293.339996	225166500	0.075481	NaN	
…	…	…	…	…	
2026-01-23	449.059998	56771400	-0.000668	0.0535	
2026-01-26	435.200012	49397400	-0.031351	0.0538	
2026-01-27	430.899994	37733100	-0.009930	0.0538	
2026-01-28	431.459991	54857400	0.001299	0.0538	
2026-01-29	416.559998	81686100	-0.035144	0.0541	

Date	TSLA_EMA20	TSLA_EMA50	TSLA_beta	TSLA_log_vol	TSLA_smi	\
2021-01-04	243.256668	243.256668	NaN	18.798532	NaN	
2021-01-05	243.426192	243.326472	NaN	18.387492	NaN	
2021-01-06	244.242110	243.666349	NaN	18.714096	NaN	
2021-01-07	246.886989	244.777995	NaN	18.855683	NaN	
2021-01-08	251.311085	246.682388	NaN	19.232351	NaN	
…	…	…	…	…	…	
2026-01-23	444.582182	442.606001	2.2592	17.854543	-0.219203	
2026-01-26	443.688642	442.315570	2.2161	17.715408	-0.161527	
2026-01-27	442.470676	441.867900	2.1978	17.446048	-0.131961	
2026-01-28	441.422039	441.459747	2.2055	17.820248	-0.118549	
2026-01-29	439.054226	440.483286	2.2092	18.218394	-0.156072	

Date	TSLA_21_rolling_return	…	SPY_price	SPY_volume	SPY_log_ret	\
2021-01-04	0.158009	…	344.256805	110210800	NaN	
2021-01-05	0.145204	…	346.627686	66426200	0.006863	

```
2021-01-06                0.119842  …  348.700073   107997700     0.005961
2021-01-07                0.056438  …  353.880859    68766800     0.014748
2021-01-08               -0.035344  …  355.897186    71677200     0.005682
…                              …  …         …           …           …
2026-01-23                     NaN  …  689.229980    63059600     0.000363
2026-01-26                     NaN  …  692.729980    60473800     0.005065
2026-01-27                     NaN  …  695.489990    55506100     0.003976
2026-01-28                     NaN  …  695.419983    61172200    -0.000101
2026-01-29                     NaN  …  694.039978    97486200    -0.001986

            SPY_volatility   SPY_EMA20   SPY_EMA50  SPY_beta  SPY_log_vol  \
Date
2021-01-04             NaN  344.256805  344.256805       NaN    18.517905
2021-01-05             NaN  344.482604  344.349781       NaN    18.011602
2021-01-06             NaN  344.884267  344.520381       NaN    18.497620
2021-01-07             NaN  345.741086  344.887458       NaN    18.046232
2021-01-08             NaN  346.708333  345.319212       NaN    18.087683
…                        …         …         …       …           …
2026-01-23          0.0145  687.451452  681.659451       1.0    17.959591
2026-01-26          0.0143  687.954169  682.093589       1.0    17.917721
2026-01-27          0.0143  688.671866  682.618938       1.0    17.832003
2026-01-28          0.0143  689.314544  683.120940       1.0    17.929203
2026-01-29          0.0142  689.764585  683.549138       1.0    18.395221

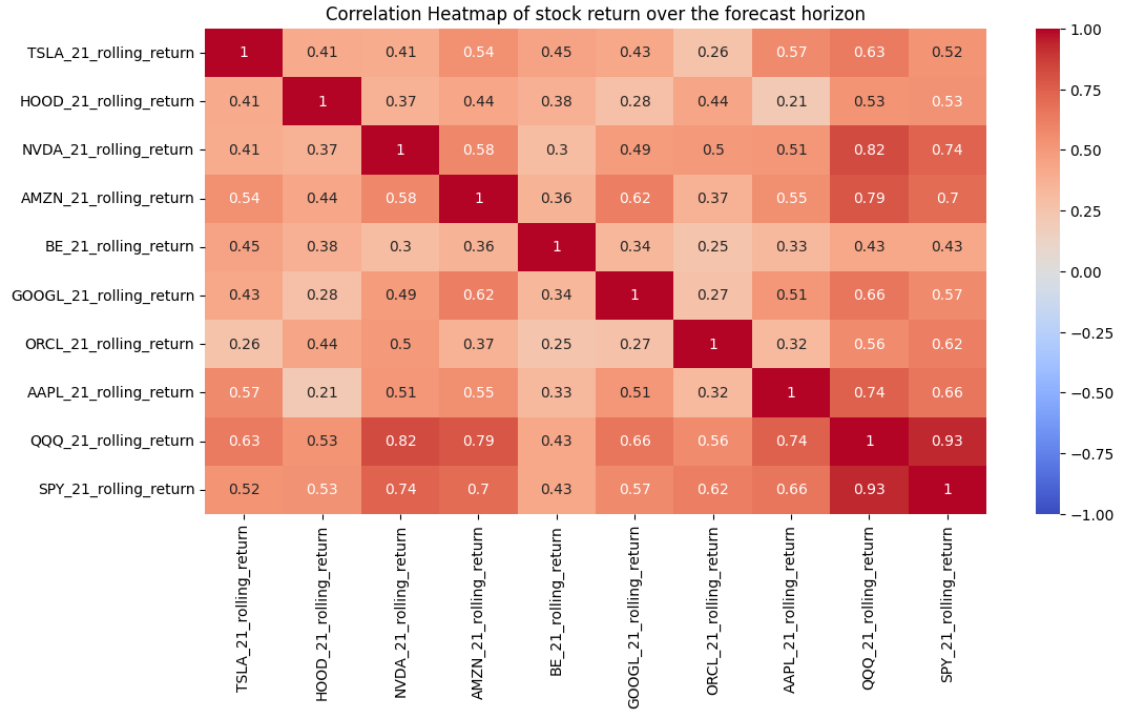
             SPY_smi  SPY_21_rolling_return
Date
2021-01-04       NaN               0.034800
2021-01-05       NaN               0.039239
2021-01-06       NaN               0.037206
2021-01-07       NaN               0.029653
2021-01-08       NaN               0.023306
…                  …                      …
2026-01-23  0.237334                    NaN
2026-01-26  0.251735                    NaN
2026-01-27  0.303462                    NaN
2026-01-28  0.364003                    NaN
2026-01-29  0.415004                    NaN

[1274 rows x 100 columns]
```

0.1.3 1.3 Stock return correlation preview

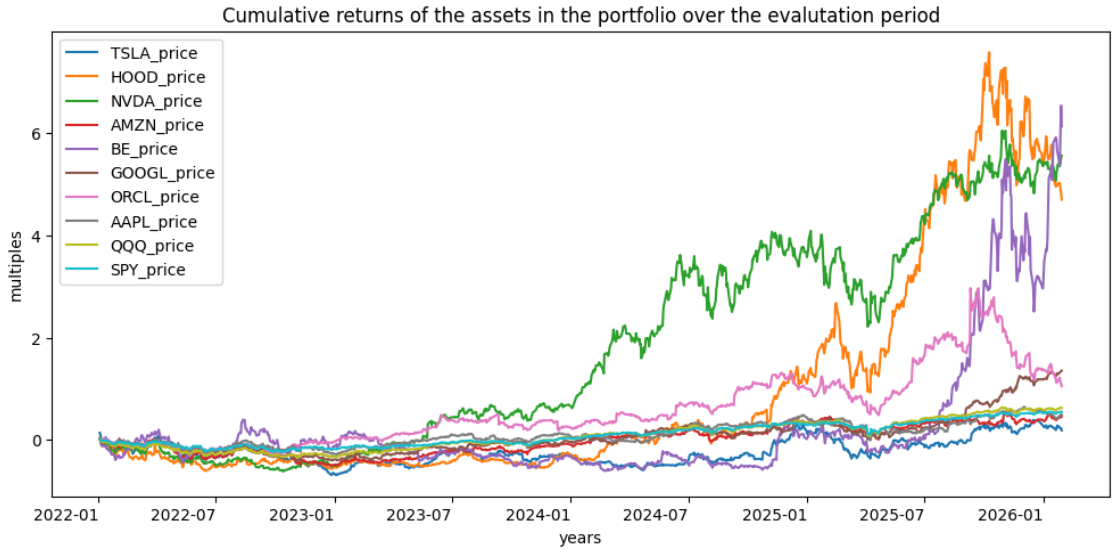
[22]:
```
plt.figure(figsize=(12, 6))
```

```
heatmap = sns.heatmap(df[['TSLA_21_rolling_return', 'HOOD_21_rolling_return',␣
 ↪'NVDA_21_rolling_return', 'AMZN_21_rolling_return', 'BE_21_rolling_return',␣
 ↪'GOOGL_21_rolling_return', 'ORCL_21_rolling_return',␣
 ↪'AAPL_21_rolling_return', 'QQQ_21_rolling_return', 'SPY_21_rolling_return']].
 ↪corr(), annot=True, cmap='coolwarm', vmin=-1, vmax=1)
heatmap.set_title('Correlation Heatmap of stock return over the forecast␣
 ↪horizon')
plt.show()
```



0.1.4 1.4 Cumulative returns of the assets in the portfolio over the evalutation period

[23]:
```
((df[['TSLA_price', 'HOOD_price', 'NVDA_price', 'AMZN_price', 'BE_price',␣
 ↪'GOOGL_price', 'ORCL_price', 'AAPL_price', 'QQQ_price','SPY_price']].
 ↪pct_change()['2022':] + 1).cumprod()-1).plot(figsize=(12,6),␣
 ↪colormap='tab10', xlabel='years',ylabel='multiples',rot=0)
plt.title('Cumulative returns of the assets in the portfolio over the␣
 ↪evalutation period')
plt.show()
```




```
Transfer the pandas dataframe to tensor flow dataset for training and testing

for example:
(850, 9, 66, 9)
 |    |  |   |
 |    |  |   └─ n_features per asset 'price', 'volume', 'log_ret', 'volatility', 'EMA20', 'EMA50', 'beta', 'log_vol', 'smi'
 |    |  └──── Lookback window
 |    └─────── N_assets 'TSLA', 'HOOD', 'NVDA', 'AMZN', 'BE', 'GOOGL', 'ORCL', 'AAPL', 'QQQ'
 └──────────── N_samples (valid prediction points)
```

[24]:
```
feature_df = df
X, y, assets, feature_names, dates = data.create_tensors(feature_df)
print("X shape:", X.shape)
print("y shape:", y.shape)
print("feature_names:", feature_names)
print("assets:", assets)
print("dates:", dates)
```

```
X shape: (978, 9, 66, 9)
y shape: (978, 9)
feature_names: ['price', 'volume', 'log_ret', 'volatility', 'EMA20', 'EMA50',
'beta', 'log_vol', 'smi']
assets: ['TSLA', 'HOOD', 'NVDA', 'AMZN', 'BE', 'GOOGL', 'ORCL', 'AAPL', 'QQQ']
dates: DatetimeIndex(['2022-02-04', '2022-02-07', '2022-02-08', '2022-02-09',
               '2022-02-10', '2022-02-11', '2022-02-14', '2022-02-15',
               '2022-02-16', '2022-02-17',
               …
               '2025-12-15', '2025-12-16', '2025-12-17', '2025-12-18',
               '2025-12-19', '2025-12-22', '2025-12-23', '2025-12-24',
               '2025-12-26', '2025-12-29'],
              dtype='datetime64[ns]', length=978, freq=None)
```

[25]:
```
X[0,0,0] #all feature values for TSLA ~66 days before 2022-07-14
```

[25]:
```
array([ 3.90666656e+02,  1.28213400e+08, -3.07427480e-02,  4.82000000e-02,
        3.22158310e+02,  2.84738108e+02,  8.94900000e-01,  1.86692066e+01,
        8.03556849e-01])
```

[26]:
```
y[0] #target 21 days after 2022-07-14 rolling return for all 9 asset
```

[26]:
```
array([-0.11332011, -0.25612555, -0.12238371, -0.14754929,  0.50745152,
       -0.11988167, -0.11309033, -0.09071482, -0.10182553])
```

0.2 2. Build the Variational LSTM Model

0.2.1 2.1 Define the Variational LSTM Model

1. NLL (Gaussian negative log-likelihood)
Per-sample NLL under a Gaussian predictive distribution with mean $\hat{\mu}$ and log-variance $\log \hat{\sigma}^2$:

$$\begin{aligned}\mathrm{NLL}_i &= \frac{1}{2}\log \hat{\sigma}_i^2 + \frac{1}{2}\frac{(y_i - \hat{\mu}_i)^2}{\hat{\sigma}_i^2} \\ &= \frac{1}{2}\hat{s}_i + \frac{1}{2}\frac{(y_i - \hat{\mu}_i)^2}{e^{\hat{s}_i}}\end{aligned}$$

where $\hat{s}_i = \log \hat{\sigma}_i^2$ is the model's predicted log-variance. This penalizes prediction error and rewards appropriate uncertainty (high $\hat{\sigma}^2$ when error is large).

2. Weighted NLL (time-weighted)
Recent samples are up-weighted via exponential decay in "age":

$$w_i = \exp\left(-\lambda \frac{\mathrm{age}_i}{\max_k \mathrm{age}_k}\right)$$

$$\mathrm{weighted\_nll} = \frac{1}{N}\sum_i w_i \cdot \mathrm{NLL}_i$$

with $\lambda =$ `recency_weight` (default 2.0).

3. KL loss (latent regularizer)
KL divergence from the approximate posterior $q(z \mid x)$ to the prior $p(z) = \mathcal{N}(0, I)$ (diagonal Gaussian):

$$\mathrm{kl\_loss} = -\frac{1}{2}\frac{1}{N}\sum_i \sum_d \left(1 + \log \sigma_{d,i}^2 - \mu_{d,i}^2 - \sigma_{d,i}^2\right)$$

where $z \sim \mathcal{N}(\mu, \mathrm{diag}(\sigma^2))$ is the latent from the encoder. This keeps the latent from straying too far from the prior.

4. Direction loss
Penalizes sign mismatch between target y and predicted mean $\hat{\mu}$:

$$\text{sign\_mismatch}_i = -\tanh(y_i) \cdot \tanh(\hat{\mu}_i)$$

$$\text{loss\_direction} = \frac{1}{N} \sum_i \max(0, \text{sign\_mismatch}_i)$$

So only opposite-sign pairs ($y_i \hat{\mu}_i < 0$) add to the loss.

5. Total loss (training objective)

$$\mathcal{L} = \underbrace{\overline{\text{weighted\_nll}}}_{\text{time-weighted NLL}} + \beta \cdot \underbrace{\overline{\text{kl\_loss}}}_{\text{KL regularizer}} + 0.5 \cdot \underbrace{\text{loss\_direction}}_{\text{direction penalty}}$$

with β controlling the strength of the KL term (default 0.02).

[27]:
```
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers, models, backend as K, optimizers

class Sampling(layers.Layer):
    """Uses (z_mean, z_log_var) to sample z, the vector encoding a digit."""
    def call(self, inputs):
        z_mean, z_log_var = inputs
        batch = tf.shape(z_mean)[0]
        dim = tf.shape(z_mean)[1]
        epsilon = tf.keras.backend.random_normal(shape=(batch, dim))
        return z_mean + tf.exp(0.5 * z_log_var) * epsilon #reparameterization␣
↪trick

class VariationalLSTM(tf.keras.Model):
    def __init__(self, input_dim, latent_dim=16, hidden_dim=32, beta=0.02,␣
↪recency_weight=2.0, **kwargs):
        super(VariationalLSTM, self).__init__(**kwargs)
        self.input_dim = input_dim
        self.latent_dim = latent_dim
        self.hidden_dim = hidden_dim
        self.beta = beta
        self.recency_weight = recency_weight #exponential decay for␣
↪time-weighted loss

        #Encoder
        self.lstm = layers.LSTM(hidden_dim, return_sequences=False)
        self.z_mean = layers.Dense(latent_dim, name="z_mean")
        self.z_log_var = layers.Dense(latent_dim, name="z_log_var")
        self.z_sampling = Sampling()

        # Decoder
```

```
        # Predicts mean return and log variance of return
        self.decoder_hidden = layers.Dense(hidden_dim, activation="relu")
        self.return_mean = layers.Dense(1, name="return_mean")
        self.return_log_var = layers.Dense(1, name="return_log_var") # Predict␣
↪log variance for stability

        self.kl_loss_tracker = tf.keras.metrics.Mean(name="kl_loss")

    def call(self, inputs):
        h = self.lstm(inputs)  # Shape: (batch, hidden_dim), this gives us the␣
↪hidden layer
        z_mean = self.z_mean(h) # Predicts:   = f (h) where f  is learned
        z_log_var = self.z_log_var(h) # Predicts: log( ²) = f (h) where f  is␣
↪learned
        z = self.z_sampling([z_mean, z_log_var]) # z ~ N( ,  ²)

        # Reconstruction / Prediction
        d = self.decoder_hidden(z)
        pred_return_mean = self.return_mean(d)
        pred_return_log_var = self.return_log_var(d)

        # KL Loss (will be computed in train_step, to see how close our␣
↪predicted return distribution is compare to the real distribution
        # and this is what makes z_mean the mean and z_log_var the variance)
        kl_loss = -0.5 * tf.reduce_mean(
            1 + z_log_var - tf.square(z_mean) - tf.exp(z_log_var), axis=-1
        )
        self.kl_loss_tracker.update_state(kl_loss)

        return pred_return_mean, pred_return_log_var, kl_loss

    @property
    def metrics(self):
        return [self.kl_loss_tracker]

    def train_step(self, data):
        # Custom training step to handle the specific loss structure
        # Our y_pred is (pred_return_mean, pred_return_log_var, kl_loss)

        if isinstance(data, (list, tuple)) and len(data) == 3:
            x, y, sample_age = data
        else:
            x, y = data
            sample_age = tf.zeros(tf.shape(y)[0])

        sample_age = tf.cast(sample_age, tf.float32)
        # Ensure y has consistent dtype with model output
```

```
        y = tf.cast(y, tf.float32)

        with tf.GradientTape() as tape:
            y_pred_return_mean, y_pred_return_log_var, kl_loss = self(x,␣
↪training=True)
            # clip y_pred_log_var to avoid loss_nll overflow
            y_pred_return_log_var = tf.clip_by_value(y_pred_return_log_var, -10.
↪0, 10.0)

            # Loss components

            # Gaussian Negative Log-Likelihood
            # Penalizes error and rewards correct uncertainty
            # High-confidence wrong predictions are penalized more;␣
↪low-confidence predictions are penalized less
            loss_nll = 0.5 * y_pred_return_log_var + 0.5 * tf.square(y -␣
↪y_pred_return_mean) / tf.exp(y_pred_return_log_var)

            # Directional loss: penalize sign mismatch between prediction and␣
↪target
            loss_direction = -tf.tanh(y) * tf.tanh(y_pred_return_mean)␣
↪#negative value if same direction, positive if differ
            loss_direction = tf.reduce_mean(tf.maximum(0.0, loss_direction))␣
↪#only penalize if different direction

            # Time-weighted loss: emphasize recent samples
            max_age = tf.reduce_max(sample_age)
            max_age = tf.maximum(max_age, tf.constant(1e-6, dtype=sample_age.
↪dtype))  # Avoid divide by zero
            time_weights = tf.exp(-self.recency_weight * sample_age / max_age)␣
↪#Older samples get lower weights
            time_weights = tf.cast(time_weights, loss_nll.dtype)

            weighted_nll = loss_nll * tf.expand_dims(time_weights, axis=-1)
            total_loss = (
                tf.reduce_mean(weighted_nll)
                + self.beta * tf.reduce_mean(kl_loss)
                + 0.5 * loss_direction
            )

        grads = tape.gradient(total_loss, self.trainable_weights)
        self.optimizer.apply_gradients(zip(grads, self.trainable_weights))

        return {
            "total_loss": total_loss,
            "nll": tf.reduce_mean(loss_nll),
```

```
            "kl": self.kl_loss_tracker.result(),
        }

    def test_step(self, data):
        x,y = data
        y = tf.cast(y, tf.float32)
        y_pred_return_mean, y_pred_return_log_var, kl_loss = self(x,␣
↪training=False)

        # Negative Log Likelihood Loss
        loss_nll = 0.5 * y_pred_return_log_var + 0.5 * tf.square(y -␣
↪y_pred_return_mean) / tf.exp(y_pred_return_log_var)
        loss_nll = tf.reduce_mean(loss_nll)

        # Directional loss: penalize sign mismatch between prediction and target
        sign_mismatch = -tf.tanh(y) * tf.tanh(y_pred_return_mean)
        loss_direction = tf.reduce_mean(tf.maximum(0.0, sign_mismatch))

        # Total loss = NLL + KL
        # kl_loss is per-sample, reduce to scalar
        kl_loss_scalar = tf.reduce_mean(kl_loss)
        total_loss = loss_nll + self.beta * kl_loss_scalar + 0.5 *␣
↪loss_direction

        return {
            "loss": total_loss,
            "nll": loss_nll,
            "kl": self.kl_loss_tracker.result(),
            "direction": loss_direction
        }
```

0.2.2 2.2 Training the prediction model (predict the stock return and volatility over the forecast horizon)

train and test data split

[28]:
```
from tensorflow import keras
from tensorflow.keras import layers, models, backend as K, optimizers

n_features = X.shape[3]
x_flat = X.reshape(-1, LOOKBACK, n_features)
y_flat = y.reshape(-1)

#split into train and test
n_train = int(0.8 * len(x_flat))
```

0.2.3 2.3 Training the allocation model

1. Covariance matrix

$$\hat{H} = D\,\Sigma_{\text{corr}}\,D$$

with $D = \text{diag}(\hat{H}_1, \dots, \hat{H}_n)$ (predicted volatilities from the model) and Σ_{corr} the sample correlation of asset returns over a lookback window (e.g. 60 days).

2. Portfolio return and volatility
For weights $w \in \mathbb{R}^n$ and expected returns μ:

$$\mu_p = w^\top \mu, \qquad \sigma_p = \sqrt{w^\top \hat{H} w}$$

3. Max-drawdown proxy
Max drawdown over the horizon is approximated from volatility:

$$\widehat{\text{MDD}} = \max\left(\epsilon,\ 2\sqrt{\texttt{forecast\_horizon}}\,\sigma_p\right)$$

`forecast_horizon` is the date we look forward to predict the portfolio return and volatility. $\epsilon = 10^{-4}$ to handle the case when $\sigma_p \approx 0$.

4. Objective (ratio to maximize)
The *ratio* combines return vs. drawdown and an extra return term:

- If $\mu_p > 0$:

$$\text{ratio} = \frac{\mu_p}{\widehat{\text{MDD}}} + \alpha\,\mu_p$$

  we favor higher return and lower drawdown; $\alpha\,\mu_p$ adds a direct return incentive.

- If $\mu_p \le 0$:

$$\text{ratio} = \mu_p\,\sqrt{\texttt{forecast\_horizon}} \cdot \widehat{\text{MDD}}$$

  then worse (more negative) return or higher drawdown is penalized.

5. Optimization problem
We *minimize* −ratio (equivalent to *maximizing* ratio):

$$\min_{w} \quad -\text{ratio}(w)$$

$$\text{s.t.} \quad \sum_{j=1}^{n} w_j = 1, \quad 0 \le w_j \le 1$$

Implemented with SLSQP: long-only, fully invested weights; `alpha` controls the trade-off between return/drawdown and raw return.

[29]:
```
from scipy.optimize import minimize

class PortfolioOptimizer:
    def __init__(self, forecast_horizon: int = FORECAST_HORIZON, learning_rate:␣
 ↪float = 0.01, alpha: float = 0.2):
        self.forecast_horizon = forecast_horizon
        self.learning_rate = learning_rate
        self.alpha = alpha
    def convariance_matrix(self, predicted_vols, historical_correlation):
        """
        Construct the covariance matrix from the predicted volatilities and␣
 ↪historical correlation
        """
        D = np.diag(predicted_vols)
        sigma_hat = D @ historical_correlation @ D
        return sigma_hat

    def objective_ratio(self, weights, expected_returns, sigma_hat):
        """
        Calculate the return over max drawdown ratio (with positive return␣
 ↪incentive and negative drawdown penalty) of the portfolio
        """
        portfolio_return = np.sum(weights * expected_returns)
        # we use the volitility to estimate the maximum drawdown in the future
        port_vol = float(np.sqrt(weights.T @ sigma_hat @ weights))
        max_dd = max(1e-4, 2.0 * np.sqrt(self.forecast_horizon) * port_vol)

        if portfolio_return > 0:
            ratio = portfolio_return / max_dd + self.alpha * portfolio_return
        else:
            ratio = portfolio_return * np.sqrt(self.forecast_horizon) * max_dd

        return -ratio

    def optimize_portfolio(self, predicted_returns, covariance_matrix):
        """
        Optimize the portfolio allocation based on the predicted returns,␣
 ↪volatilities, and covariance matrix
        """
        n_assets = len(predicted_returns)
        initial_weights = np.ones(n_assets) / n_assets
        # Constraints: sum(w) = 1
        constraints = ({'type': 'eq', 'fun': lambda x: np.sum(x) - 1})

        # Bounds: 0 <= w <= 1
        bounds = tuple((0.0, 1.0) for _ in range(n_assets))
```

```
        allocation = minimize(self.objective_ratio,
                              initial_weights,
                              args=(predicted_returns, covariance_matrix),
                              method='SLSQP',
                              bounds=bounds,
                              constraints=constraints)

        return allocation.x
```

0.2.4 2.4 Sharpe ratio

$$S = \alpha \cdot \frac{\mathbb{E}[R_p - R_f]}{\sigma_p} = \sqrt{252} \cdot \frac{\bar{R}_p - R_f}{\sigma_p}$$

where: - R_p: portfolio return - R_f: risk-free rate - σ_p: standard deviation of portfolio (excess) returns - $\alpha = \sqrt{252}$: annualization factor

[30]:
```
# Use risk-free rate = 0 for simplicity (annualized Sharpe: sqrt(252) * mean /␣
↪std)
def calc_sharpe(returns):
    return np.sqrt(252) * np.mean(returns) / np.std(returns)
```

0.2.5 2.5 Hyperparameter tunning

[31]:
```
import tensorflow as tf
from tensorflow.keras import optimizers
import optuna

# Time-blocked split with embargo to avoid leakage
n_total = len(dates)
train_end = int(0.8 * n_total)
embargo = FORECAST_HORIZON
val_start = min(train_end + embargo, n_total - 1)


def objective(trial):
    tf.keras.utils.set_random_seed(42 + trial.number)
    tf.keras.backend.clear_session()

    if val_start >= n_total - 1:
        return -999.0

    batch_size = trial.suggest_categorical("batch_size", [64, 128, 512, 1024])
    n_epochs = trial.suggest_int("epochs", 100, 2000, step=50)
    hidden_dim = trial.suggest_categorical("hidden_dim", [128, 256, 512])
    latent_dim = trial.suggest_categorical("latent_dim", [64, 128, 256])
```

```
    lr = trial.suggest_float("learning_rate", 0.0001, 0.005, log=True)
    beta = trial.suggest_float("beta", 0.01, 0.1, step=0.01)

    model = VariationalLSTM(
        input_dim=n_features,
        latent_dim=latent_dim,
        hidden_dim=hidden_dim,
        beta=beta,
        recency_weight=2.0,
    )
    model.compile(optimizer=optimizers.Adam(learning_rate=lr))
    model.fit(
        x_flat[:train_end], y_flat[:train_end],
        validation_data=(x_flat[val_start:], y_flat[val_start:]),
        epochs=n_epochs,
        batch_size=batch_size,
        verbose=0,
        callbacks=[
            tf.keras.callbacks.EarlyStopping(
                monitor="val_loss", mode="min", patience=5,␣
↪restore_best_weights=True
            )
        ],
    )

    optimizer_obj = PortfolioOptimizer()
    asset_ret_cols = [f"{a}_log_ret" for a in assets]

    capital = 1.0
    portfolio_values_list = []
    current_weights = np.ones(len(assets)) / len(assets)

    for t in range(val_start, n_total):
        current_date = dates[t]
        is_month_start = (t == val_start) or (dates[t - 1].month !=␣
↪current_date.month)

        if is_month_start:
            X_curr = X[t]  # shape: (n_assets, lookback, n_features)
            pred_mean, pred_log_var, _ = model(X_curr, training=False)
            predicted_returns = pred_mean.numpy().flatten()
            pred_vols = np.exp(0.5 * pred_log_var.numpy().flatten())

            date_loc = feature_df.index.get_loc(current_date)
            past_60_start = max(0, date_loc - 60)
            past_60_df = feature_df.iloc[past_60_start:date_loc]
            if len(past_60_df) >= 2:
```

```
                hist_corr = past_60_df[asset_ret_cols].corr().values
            else:
                hist_corr = np.eye(len(assets))

            sigma_hat = optimizer_obj.convariance_matrix(pred_vols, hist_corr)
            current_weights = optimizer_obj.
 ↪optimize_portfolio(predicted_returns, sigma_hat)

        actual_daily_returns = feature_df.loc[current_date, asset_ret_cols].
 ↪values
        portfolio_ret = np.sum(current_weights * actual_daily_returns)
        capital *= np.exp(portfolio_ret)
        portfolio_values_list.append(capital)

    if len(portfolio_values_list) < 2 or portfolio_values_list[-1] <= 0:
        return -999.0

    portfolio_daily_returns = np.diff(np.log(np.array(portfolio_values_list)))
    portfolio_sharpe = calc_sharpe(portfolio_daily_returns)
    if not np.isfinite(portfolio_sharpe):
        return -999.0

    return float(portfolio_sharpe)


study = optuna.create_study(direction="maximize")
study.optimize(objective, n_trials=50)

print("Best hyperparameters:", study.best_params)
print("Best Sharpe (validation):", study.best_value)
```

```
[I 2026-02-01 20:25:15,118] A new study created in memory with name: no-
name-c68469b7-6fae-4220-939a-1678f1c2c8e5
[I 2026-02-01 20:25:54,258] Trial 0 finished with value: 1.3216530416621677 and
parameters: {'batch_size': 128, 'epochs': 850, 'hidden_dim': 256, 'latent_dim':
256, 'learning_rate': 0.0009667947840958333, 'beta': 0.09999999999999999}. Best
is trial 0 with value: 1.3216530416621677.
[I 2026-02-01 20:27:24,419] Trial 1 finished with value: 1.9541600918510365 and
parameters: {'batch_size': 512, 'epochs': 200, 'hidden_dim': 256, 'latent_dim':
64, 'learning_rate': 0.00011360296682199247, 'beta': 0.01}. Best is trial 1 with
value: 1.9541600918510365.
[I 2026-02-01 20:28:22,484] Trial 2 finished with value: 2.6998432548928304 and
parameters: {'batch_size': 512, 'epochs': 1250, 'hidden_dim': 256, 'latent_dim':
128, 'learning_rate': 0.0006210253701373365, 'beta': 0.03}. Best is trial 2 with
value: 2.6998432548928304.
[I 2026-02-01 20:29:14,919] Trial 3 finished with value: 3.061078259623023 and
parameters: {'batch_size': 128, 'epochs': 1850, 'hidden_dim': 512, 'latent_dim':
```

128, 'learning_rate': 0.0004011917322191682, 'beta': 0.09999999999999999}. Best is trial 3 with value: 3.061078259623023.
[I 2026-02-01 20:30:42,090] Trial 4 finished with value: 4.011163037938426 and parameters: {'batch_size': 64, 'epochs': 1600, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00010725130911761956, 'beta': 0.02}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:31:25,397] Trial 5 finished with value: 2.593531601145492 and parameters: {'batch_size': 512, 'epochs': 1350, 'hidden_dim': 256, 'latent_dim': 256, 'learning_rate': 0.0018579060848349209, 'beta': 0.05}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:32:06,687] Trial 6 finished with value: 2.957382862297244 and parameters: {'batch_size': 1024, 'epochs': 950, 'hidden_dim': 256, 'latent_dim': 256, 'learning_rate': 0.00036201144657866747, 'beta': 0.01}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:32:24,701] Trial 7 finished with value: 2.363572786443897 and parameters: {'batch_size': 64, 'epochs': 550, 'hidden_dim': 256, 'latent_dim': 64, 'learning_rate': 0.0006248591272341973, 'beta': 0.03}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:32:50,508] Trial 8 finished with value: 2.4294008182551354 and parameters: {'batch_size': 1024, 'epochs': 150, 'hidden_dim': 128, 'latent_dim': 128, 'learning_rate': 0.00172225947035129, 'beta': 0.03}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:33:23,681] Trial 9 finished with value: 2.4076166121447415 and parameters: {'batch_size': 512, 'epochs': 600, 'hidden_dim': 128, 'latent_dim': 128, 'learning_rate': 0.0007432995793824356, 'beta': 0.03}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:33:54,155] Trial 10 finished with value: 2.011466089556685 and parameters: {'batch_size': 64, 'epochs': 2000, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00475452266067222, 'beta': 0.06999999999999999}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:35:30,777] Trial 11 finished with value: 0.7232727865884759 and parameters: {'batch_size': 128, 'epochs': 1850, 'hidden_dim': 512, 'latent_dim': 128, 'learning_rate': 0.00013319248699646206, 'beta': 0.09999999999999999}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:37:12,868] Trial 12 finished with value: 3.4490296966053915 and parameters: {'batch_size': 64, 'epochs': 1650, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00023752556354818467, 'beta': 0.08}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:39:03,287] Trial 13 finished with value: 1.2816899297650155 and parameters: {'batch_size': 64, 'epochs': 1550, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00018875226271759457, 'beta': 0.06999999999999999}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:40:54,898] Trial 14 finished with value: 2.622040853583499 and parameters: {'batch_size': 64, 'epochs': 1550, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00021792871080039344, 'beta': 0.08}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:43:25,046] Trial 15 finished with value: 2.709275772231986 and parameters: {'batch_size': 64, 'epochs': 1600, 'hidden_dim': 512, 'latent_dim':

256, 'learning_rate': 0.0002402639467100813, 'beta': 0.060000000000000005}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:46:07,210] Trial 16 finished with value: 1.5278813268977298 and parameters: {'batch_size': 64, 'epochs': 1250, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00013508094717063418, 'beta': 0.05}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:47:24,763] Trial 17 finished with value: 3.3589920349151456 and parameters: {'batch_size': 64, 'epochs': 1700, 'hidden_dim': 512, 'latent_dim': 64, 'learning_rate': 0.00010128163121095972, 'beta': 0.08}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:48:01,869] Trial 18 finished with value: 0.6827687914893305 and parameters: {'batch_size': 64, 'epochs': 1400, 'hidden_dim': 128, 'latent_dim': 256, 'learning_rate': 0.00036759951098696566, 'beta': 0.08}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:50:08,637] Trial 19 finished with value: 3.9631218002689796 and parameters: {'batch_size': 1024, 'epochs': 1150, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.0001908976007640692, 'beta': 0.04}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:52:52,293] Trial 20 finished with value: 2.1587389184043095 and parameters: {'batch_size': 1024, 'epochs': 1100, 'hidden_dim': 512, 'latent_dim': 64, 'learning_rate': 0.0001767155095654499, 'beta': 0.02}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:54:03,745] Trial 21 finished with value: 1.8664762036011566 and parameters: {'batch_size': 1024, 'epochs': 1100, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00024392341350388955, 'beta': 0.04}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:56:50,219] Trial 22 finished with value: 2.702856767241978 and parameters: {'batch_size': 1024, 'epochs': 1750, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.0003036341155778812, 'beta': 0.04}. Best is trial 4 with value: 4.011163037938426.
[I 2026-02-01 20:59:26,844] Trial 23 finished with value: 4.319447022750583 and parameters: {'batch_size': 1024, 'epochs': 2000, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00016626996520281164, 'beta': 0.04}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:02:11,041] Trial 24 finished with value: 1.9036548445672463 and parameters: {'batch_size': 1024, 'epochs': 2000, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00015731644457159122, 'beta': 0.02}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:02:41,850] Trial 25 finished with value: 2.800321066409359 and parameters: {'batch_size': 1024, 'epochs': 700, 'hidden_dim': 128, 'latent_dim': 256, 'learning_rate': 0.00010597945294189232, 'beta': 0.04}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:04:30,532] Trial 26 finished with value: 2.782525215407884 and parameters: {'batch_size': 1024, 'epochs': 1850, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00015692323792273677, 'beta': 0.02}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:06:24,667] Trial 27 finished with value: 2.6276813651268527 and parameters: {'batch_size': 1024, 'epochs': 1450, 'hidden_dim': 512,

'latent_dim': 256, 'learning_rate': 0.0004896870741574927, 'beta': 0.05}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:07:39,504] Trial 28 finished with value: 1.088049650324509 and parameters: {'batch_size': 1024, 'epochs': 1250, 'hidden_dim': 512, 'latent_dim': 64, 'learning_rate': 0.00028357093575479486, 'beta': 0.04}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:07:59,345] Trial 29 finished with value: 0.8362250319853695 and parameters: {'batch_size': 128, 'epochs': 900, 'hidden_dim': 128, 'latent_dim': 256, 'learning_rate': 0.0009523156010398289, 'beta': 0.060000000000000005}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:09:14,103] Trial 30 finished with value: 1.817472715904336 and parameters: {'batch_size': 128, 'epochs': 350, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00014225075176264992, 'beta': 0.02}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:10:54,605] Trial 31 finished with value: 2.860218612317927 and parameters: {'batch_size': 64, 'epochs': 1700, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.0002066529512965033, 'beta': 0.09}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:12:16,317] Trial 32 finished with value: 1.1179878126111542 and parameters: {'batch_size': 64, 'epochs': 2000, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00012548173869195815, 'beta': 0.01}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:15:12,865] Trial 33 finished with value: 2.906228256915107 and parameters: {'batch_size': 512, 'epochs': 1600, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.00017758064954931865, 'beta': 0.060000000000000005}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:17:41,554] Trial 34 finished with value: 0.8647200506498082 and parameters: {'batch_size': 1024, 'epochs': 1850, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.0002858650176084311, 'beta': 0.03}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:18:32,611] Trial 35 finished with value: 1.8584961687946429 and parameters: {'batch_size': 64, 'epochs': 1250, 'hidden_dim': 256, 'latent_dim': 256, 'learning_rate': 0.0004753398789473475, 'beta': 0.05}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:20:23,094] Trial 36 finished with value: 1.6583344415973214 and parameters: {'batch_size': 512, 'epochs': 1400, 'hidden_dim': 512, 'latent_dim': 128, 'learning_rate': 0.00011641622071599795, 'beta': 0.06999999999999999}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:20:56,998] Trial 37 finished with value: 2.8200634181620865 and parameters: {'batch_size': 1024, 'epochs': 800, 'hidden_dim': 256, 'latent_dim': 64, 'learning_rate': 0.0014766043262807093, 'beta': 0.01}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:21:24,455] Trial 38 finished with value: 3.208835434288755 and parameters: {'batch_size': 128, 'epochs': 1750, 'hidden_dim': 512, 'latent_dim': 256, 'learning_rate': 0.003976777693066941, 'beta': 0.04}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:22:03,476] Trial 39 finished with value: 2.304758484198059 and parameters: {'batch_size': 64, 'epochs': 1500, 'hidden_dim': 256, 'latent_dim':

```
128, 'learning_rate': 0.00030963452288977286, 'beta': 0.03}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:23:59,228] Trial 40 finished with value: 2.0627936194158116 and
parameters: {'batch_size': 512, 'epochs': 1900, 'hidden_dim': 512, 'latent_dim':
256, 'learning_rate': 0.00045964739424008436, 'beta': 0.09}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:25:57,228] Trial 41 finished with value: 2.415052290603272 and
parameters: {'batch_size': 64, 'epochs': 1700, 'hidden_dim': 512, 'latent_dim':
64, 'learning_rate': 0.00010389944579834774, 'beta': 0.08}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:27:31,586] Trial 42 finished with value: 0.9824183057971827 and
parameters: {'batch_size': 64, 'epochs': 1700, 'hidden_dim': 512, 'latent_dim':
64, 'learning_rate': 0.00010438836198211678, 'beta': 0.09}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:28:29,012] Trial 43 finished with value: 3.1260833813834057 and
parameters: {'batch_size': 64, 'epochs': 1000, 'hidden_dim': 512, 'latent_dim':
64, 'learning_rate': 0.00015839975774711555, 'beta': 0.09999999999999999}. Best
is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:29:45,829] Trial 44 finished with value: 2.157345679242399 and
parameters: {'batch_size': 64, 'epochs': 1650, 'hidden_dim': 512, 'latent_dim':
64, 'learning_rate': 0.00012626055367128 08, 'beta': 0.06999999999999999}. Best
is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:30:30,989] Trial 45 finished with value: 1.4058870707278857 and
parameters: {'batch_size': 64, 'epochs': 1950, 'hidden_dim': 128, 'latent_dim':
64, 'learning_rate': 0.00020926587651432088, 'beta': 0.08}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:31:48,570] Trial 46 finished with value: 0.9084448580691079 and
parameters: {'batch_size': 64, 'epochs': 1800, 'hidden_dim': 512, 'latent_dim':
128, 'learning_rate': 0.00017287583064068854, 'beta': 0.05}. Best is trial 23
with value: 4.319447022750583.
[I 2026-02-01 21:33:24,110] Trial 47 finished with value: 1.6448138721554344 and
parameters: {'batch_size': 1024, 'epochs': 1500, 'hidden_dim': 256,
'latent_dim': 256, 'learning_rate': 0.00024213760743327638, 'beta':
0.060000000000000005}. Best is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:34:17,168] Trial 48 finished with value: 4.033928073165989 and
parameters: {'batch_size': 64, 'epochs': 1350, 'hidden_dim': 512, 'latent_dim':
64, 'learning_rate': 0.00013356726447454902, 'beta': 0.06999999999999999}. Best
is trial 23 with value: 4.319447022750583.
[I 2026-02-01 21:35:27,677] Trial 49 finished with value: 1.4889328361194512 and
parameters: {'batch_size': 128, 'epochs': 1300, 'hidden_dim': 512, 'latent_dim':
256, 'learning_rate': 0.00015092401103922423, 'beta': 0.06999999999999999}. Best
is trial 23 with value: 4.319447022750583.

Best hyperparameters: {'batch_size': 1024, 'epochs': 2000, 'hidden_dim': 512,
'latent_dim': 256, 'learning_rate': 0.00016626996520281164, 'beta': 0.04}
Best Sharpe (validation): 4.319447022750583
```

[32]:
```
#Tuned parameters
BATCH_SIZE = study.best_params['batch_size']
EPOCHS = study.best_params['epochs']
LEARNING_RATE = study.best_params['learning_rate']
HIDDEN_DIM = study.best_params['hidden_dim']
LATENT_DIM = study.best_params['latent_dim']
beta = study.best_params['beta']
```

run the model with the tuned parameters

[33]:
```
model = VariationalLSTM(input_dim=n_features, latent_dim=LATENT_DIM,␣
 ↪hidden_dim=HIDDEN_DIM, beta=beta, recency_weight=2.0)
model.compile(optimizer=optimizers.Adam(learning_rate=LEARNING_RATE))

history = model.fit(x_flat[:n_train], y_flat[:n_train], validation_split=0.2,␣
 ↪epochs=EPOCHS, batch_size=BATCH_SIZE)

#evaluate on test set
print("Evaluating on test set...")
test_loss = model.evaluate(x_flat[n_train:], y_flat[n_train:])
```

```
Epoch 1/2000
6/6             5s 693ms/step - kl:
0.2019 - nll: 0.3557 - total_loss: 0.3775 - val_direction: 0.0153 - val_kl:
0.1958 - val_loss: 0.1494 - val_nll: 0.1339
Epoch 2/2000
6/6             4s 625ms/step - kl:
0.1929 - nll: 0.1317 - total_loss: 0.1489 - val_direction: 0.0269 - val_kl:
0.1899 - val_loss: 0.0747 - val_nll: 0.0537
Epoch 3/2000
6/6             4s 624ms/step - kl:
0.1898 - nll: -0.1536 - total_loss: -0.1371 - val_direction: 0.0143 - val_kl:
0.1905 - val_loss: -0.2428 - val_nll: -0.2576
Epoch 4/2000
6/6             4s 624ms/step - kl:
0.1926 - nll: -0.3334 - total_loss: -0.3184 - val_direction: 0.0168 - val_kl:
0.1983 - val_loss: -0.3688 - val_nll: -0.3852
Epoch 5/2000
6/6             4s 617ms/step - kl:
0.2033 - nll: -0.4292 - total_loss: -0.4143 - val_direction: 0.0159 - val_kl:
0.2116 - val_loss: -0.4473 - val_nll: -0.4637
Epoch 6/2000
6/6             4s 616ms/step - kl:
0.2177 - nll: -0.5879 - total_loss: -0.5730 - val_direction: 0.0102 - val_kl:
0.2286 - val_loss: -0.5858 - val_nll: -0.6000
Epoch 7/2000
6/6             4s 615ms/step - kl:
0.2358 - nll: -0.6815 - total_loss: -0.6666 - val_direction: 0.0117 - val_kl:
```

```
0.2487 - val_loss: -0.6675 - val_nll: -0.6832
Epoch 8/2000
6/6            4s 616ms/step - kl:
0.2573 - nll: -0.7355 - total_loss: -0.7201 - val_direction: 0.0117 - val_kl:
0.2721 - val_loss: -0.7382 - val_nll: -0.7549
Epoch 9/2000
6/6            5s 839ms/step - kl:
0.2818 - nll: -0.8275 - total_loss: -0.8115 - val_direction: 0.0115 - val_kl:
0.2979 - val_loss: -0.7490 - val_nll: -0.7667
Epoch 10/2000
6/6            4s 707ms/step - kl:
0.3080 - nll: -0.8946 - total_loss: -0.8780 - val_direction: 0.0090 - val_kl:
0.3253 - val_loss: -0.8551 - val_nll: -0.8726
Epoch 11/2000
6/6            4s 719ms/step - kl:
0.3362 - nll: -0.9266 - total_loss: -0.9089 - val_direction: 0.0103 - val_kl:
0.3544 - val_loss: -0.8166 - val_nll: -0.8359
Epoch 12/2000
6/6            4s 697ms/step - kl:
0.3662 - nll: -0.9698 - total_loss: -0.9511 - val_direction: 0.0097 - val_kl:
0.3858 - val_loss: -0.8515 - val_nll: -0.8718
Epoch 13/2000
6/6            4s 640ms/step - kl:
0.3979 - nll: -1.0404 - total_loss: -1.0208 - val_direction: 0.0085 - val_kl:
0.4178 - val_loss: -0.8920 - val_nll: -0.9130
Epoch 14/2000
6/6            4s 628ms/step - kl:
0.4299 - nll: -1.0833 - total_loss: -1.0628 - val_direction: 0.0069 - val_kl:
0.4498 - val_loss: -0.9820 - val_nll: -1.0034
Epoch 15/2000
6/6            4s 624ms/step - kl:
0.4617 - nll: -1.1226 - total_loss: -1.1011 - val_direction: 0.0080 - val_kl:
0.4815 - val_loss: -0.9276 - val_nll: -0.9508
Epoch 16/2000
6/6            4s 659ms/step - kl:
0.4935 - nll: -1.1210 - total_loss: -1.0981 - val_direction: 0.0059 - val_kl:
0.5130 - val_loss: -1.0793 - val_nll: -1.1028
Epoch 17/2000
6/6            4s 638ms/step - kl:
0.5248 - nll: -1.1876 - total_loss: -1.1638 - val_direction: 0.0062 - val_kl:
0.5443 - val_loss: -1.0137 - val_nll: -1.0386
Epoch 18/2000
6/6            4s 620ms/step - kl:
0.5555 - nll: -1.2052 - total_loss: -1.1804 - val_direction: 0.0084 - val_kl:
0.5735 - val_loss: -0.8633 - val_nll: -0.8905
Epoch 19/2000
6/6            4s 740ms/step - kl:
0.5834 - nll: -1.2108 - total_loss: -1.1850 - val_direction: 0.0039 - val_kl:
```

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0.5995 - val_loss: -1.1992 - val_nll: -1.2252
Epoch 20/2000
6/6             4s 735ms/step - kl:
0.6094 - nll: -1.2435 - total_loss: -1.2169 - val_direction: 0.0052 - val_kl:
0.6260 - val_loss: -1.0830 - val_nll: -1.1106
Epoch 21/2000
6/6             4s 637ms/step - kl:
0.6355 - nll: -1.2584 - total_loss: -1.2309 - val_direction: 0.0054 - val_kl:
0.6504 - val_loss: -1.0667 - val_nll: -1.0954
Epoch 22/2000
6/6             4s 666ms/step - kl:
0.6584 - nll: -1.2624 - total_loss: -1.2340 - val_direction: 0.0062 - val_kl:
0.6718 - val_loss: -1.0062 - val_nll: -1.0362
Epoch 23/2000
6/6             4s 626ms/step - kl:
0.6796 - nll: -1.2539 - total_loss: -1.2248 - val_direction: 0.0044 - val_kl:
0.6922 - val_loss: -1.1266 - val_nll: -1.1565
Epoch 24/2000
6/6             4s 655ms/step - kl:
0.6994 - nll: -1.3170 - total_loss: -1.2875 - val_direction: 0.0038 - val_kl:
0.7116 - val_loss: -1.1615 - val_nll: -1.1919
Epoch 25/2000
6/6             4s 629ms/step - kl:
0.7188 - nll: -1.3074 - total_loss: -1.2771 - val_direction: 0.0060 - val_kl:
0.7302 - val_loss: -0.9630 - val_nll: -0.9952
Epoch 26/2000
6/6             4s 628ms/step - kl:
0.7358 - nll: -1.2890 - total_loss: -1.2579 - val_direction: 0.0054 - val_kl:
0.7454 - val_loss: -1.0351 - val_nll: -1.0676
Epoch 27/2000
6/6             4s 620ms/step - kl:
0.7510 - nll: -1.3033 - total_loss: -1.2717 - val_direction: 0.0034 - val_kl:
0.7604 - val_loss: -1.1626 - val_nll: -1.1947
Epoch 28/2000
6/6             4s 622ms/step - kl:
0.7654 - nll: -1.3244 - total_loss: -1.2924 - val_direction: 0.0036 - val_kl:
0.7733 - val_loss: -1.1448 - val_nll: -1.1775
Epoch 29/2000
6/6             4s 632ms/step - kl:
0.7777 - nll: -1.3414 - total_loss: -1.3091 - val_direction: 0.0039 - val_kl:
0.7855 - val_loss: -1.1081 - val_nll: -1.1415
Epoch 30/2000
6/6             5s 807ms/step - kl:
0.7897 - nll: -1.3347 - total_loss: -1.3020 - val_direction: 0.0054 - val_kl:
0.7967 - val_loss: -1.0033 - val_nll: -1.0378
Epoch 31/2000
6/6             4s 667ms/step - kl:
0.7998 - nll: -1.3227 - total_loss: -1.2895 - val_direction: 0.0030 - val_kl:
```

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0.8052 - val_loss: -1.1856 - val_nll: -1.2193
Epoch 32/2000
6/6            4s 741ms/step - kl:
0.8086 - nll: -1.3528 - total_loss: -1.3195 - val_direction: 0.0020 - val_kl:
0.8144 - val_loss: -1.2574 - val_nll: -1.2909
Epoch 33/2000
6/6            4s 645ms/step - kl:
0.8173 - nll: -1.3552 - total_loss: -1.3216 - val_direction: 0.0040 - val_kl:
0.8221 - val_loss: -1.0860 - val_nll: -1.1209
Epoch 34/2000
6/6            4s 642ms/step - kl:
0.8244 - nll: -1.3399 - total_loss: -1.3059 - val_direction: 0.0054 - val_kl:
0.8288 - val_loss: -0.9980 - val_nll: -1.0338
Epoch 35/2000
6/6            4s 645ms/step - kl:
0.8309 - nll: -1.3380 - total_loss: -1.3038 - val_direction: 0.0022 - val_kl:
0.8349 - val_loss: -1.2254 - val_nll: -1.2599
Epoch 36/2000
6/6            4s 631ms/step - kl:
0.8372 - nll: -1.3620 - total_loss: -1.3277 - val_direction: 0.0028 - val_kl:
0.8416 - val_loss: -1.1706 - val_nll: -1.2057
Epoch 37/2000
6/6            4s 631ms/step - kl:
0.8438 - nll: -1.3621 - total_loss: -1.3276 - val_direction: 0.0038 - val_kl:
0.8476 - val_loss: -1.0984 - val_nll: -1.1342
Epoch 38/2000
6/6            4s 631ms/step - kl:
0.8493 - nll: -1.3590 - total_loss: -1.3243 - val_direction: 0.0034 - val_kl:
0.8530 - val_loss: -1.1335 - val_nll: -1.1693
Epoch 39/2000
6/6            4s 650ms/step - kl:
0.8550 - nll: -1.3568 - total_loss: -1.3219 - val_direction: 0.0034 - val_kl:
0.8587 - val_loss: -1.1146 - val_nll: -1.1507
Epoch 40/2000
6/6            5s 810ms/step - kl:
0.8600 - nll: -1.3592 - total_loss: -1.3241 - val_direction: 0.0044 - val_kl:
0.8628 - val_loss: -1.0541 - val_nll: -1.0909
Epoch 41/2000
6/6            5s 769ms/step - kl:
0.8639 - nll: -1.3468 - total_loss: -1.3114 - val_direction: 0.0041 - val_kl:
0.8665 - val_loss: -1.0732 - val_nll: -1.1099
Epoch 42/2000
6/6            4s 730ms/step - kl:
0.8675 - nll: -1.3599 - total_loss: -1.3245 - val_direction: 0.0029 - val_kl:
0.8700 - val_loss: -1.1502 - val_nll: -1.1865
Epoch 43/2000
6/6            4s 646ms/step - kl:
0.8712 - nll: -1.3640 - total_loss: -1.3285 - val_direction: 0.0032 - val_kl:
```

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0.8736 - val_loss: -1.1244 - val_nll: -1.1610
Epoch 44/2000
6/6            4s 646ms/step - kl:
0.8745 - nll: -1.3590 - total_loss: -1.3234 - val_direction: 0.0040 - val_kl:
0.8764 - val_loss: -1.0799 - val_nll: -1.1170
Epoch 45/2000
6/6            4s 646ms/step - kl:
0.8771 - nll: -1.3558 - total_loss: -1.3201 - val_direction: 0.0033 - val_kl:
0.8789 - val_loss: -1.1299 - val_nll: -1.1667
Epoch 46/2000
6/6            4s 647ms/step - kl:
0.8796 - nll: -1.3687 - total_loss: -1.3330 - val_direction: 0.0030 - val_kl:
0.8816 - val_loss: -1.1371 - val_nll: -1.1739
Epoch 47/2000
6/6            4s 648ms/step - kl:
0.8821 - nll: -1.3619 - total_loss: -1.3260 - val_direction: 0.0038 - val_kl:
0.8832 - val_loss: -1.0943 - val_nll: -1.1315
Epoch 48/2000
6/6            4s 633ms/step - kl:
0.8833 - nll: -1.3635 - total_loss: -1.3276 - val_direction: 0.0030 - val_kl:
0.8845 - val_loss: -1.1488 - val_nll: -1.1857
Epoch 49/2000
6/6            4s 635ms/step - kl:
0.8851 - nll: -1.3651 - total_loss: -1.3292 - val_direction: 0.0029 - val_kl:
0.8864 - val_loss: -1.1433 - val_nll: -1.1802
Epoch 50/2000
6/6            4s 778ms/step - kl:
0.8866 - nll: -1.3690 - total_loss: -1.3331 - val_direction: 0.0033 - val_kl:
0.8874 - val_loss: -1.1226 - val_nll: -1.1597
Epoch 51/2000
6/6            4s 726ms/step - kl:
0.8876 - nll: -1.3676 - total_loss: -1.3316 - val_direction: 0.0028 - val_kl:
0.8886 - val_loss: -1.1472 - val_nll: -1.1842
Epoch 52/2000
6/6            4s 648ms/step - kl:
0.8888 - nll: -1.3747 - total_loss: -1.3388 - val_direction: 0.0028 - val_kl:
0.8898 - val_loss: -1.1482 - val_nll: -1.1852
Epoch 53/2000
6/6            4s 681ms/step - kl:
0.8900 - nll: -1.3750 - total_loss: -1.3390 - val_direction: 0.0034 - val_kl:
0.8909 - val_loss: -1.1113 - val_nll: -1.1486
Epoch 54/2000
6/6            4s 674ms/step - kl:
0.8906 - nll: -1.3694 - total_loss: -1.3333 - val_direction: 0.0039 - val_kl:
0.8909 - val_loss: -1.0867 - val_nll: -1.1243
Epoch 55/2000
6/6            4s 647ms/step - kl:
0.8907 - nll: -1.3643 - total_loss: -1.3282 - val_direction: 0.0034 - val_kl:
```

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0.8912 - val_loss: -1.1180 - val_nll: -1.1554
Epoch 56/2000
6/6            4s 712ms/step - kl:
0.8911 - nll: -1.3648 - total_loss: -1.3287 - val_direction: 0.0033 - val_kl:
0.8914 - val_loss: -1.1198 - val_nll: -1.1571
Epoch 57/2000
6/6            4s 696ms/step - kl:
0.8909 - nll: -1.3710 - total_loss: -1.3350 - val_direction: 0.0023 - val_kl:
0.8908 - val_loss: -1.1869 - val_nll: -1.2237
Epoch 58/2000
6/6            4s 637ms/step - kl:
0.8906 - nll: -1.3753 - total_loss: -1.3393 - val_direction: 0.0027 - val_kl:
0.8908 - val_loss: -1.1501 - val_nll: -1.1871
Epoch 59/2000
6/6            4s 634ms/step - kl:
0.8903 - nll: -1.3762 - total_loss: -1.3403 - val_direction: 0.0032 - val_kl:
0.8902 - val_loss: -1.1275 - val_nll: -1.1647
Epoch 60/2000
6/6            5s 797ms/step - kl:
0.8897 - nll: -1.3691 - total_loss: -1.3331 - val_direction: 0.0035 - val_kl:
0.8897 - val_loss: -1.1120 - val_nll: -1.1493
Epoch 61/2000
6/6            5s 801ms/step - kl:
0.8892 - nll: -1.3708 - total_loss: -1.3348 - val_direction: 0.0029 - val_kl:
0.8892 - val_loss: -1.1465 - val_nll: -1.1835
Epoch 62/2000
6/6            4s 719ms/step - kl:
0.8889 - nll: -1.3715 - total_loss: -1.3356 - val_direction: 0.0033 - val_kl:
0.8891 - val_loss: -1.1204 - val_nll: -1.1576
Epoch 63/2000
6/6            4s 645ms/step - kl:
0.8886 - nll: -1.3733 - total_loss: -1.3374 - val_direction: 0.0028 - val_kl:
0.8885 - val_loss: -1.1541 - val_nll: -1.1910
Epoch 64/2000
6/6            4s 642ms/step - kl:
0.8881 - nll: -1.3728 - total_loss: -1.3369 - val_direction: 0.0030 - val_kl:
0.8881 - val_loss: -1.1392 - val_nll: -1.1762
Epoch 65/2000
6/6            4s 643ms/step - kl:
0.8874 - nll: -1.3716 - total_loss: -1.3358 - val_direction: 0.0031 - val_kl:
0.8870 - val_loss: -1.1364 - val_nll: -1.1734
Epoch 66/2000
6/6            4s 635ms/step - kl:
0.8864 - nll: -1.3712 - total_loss: -1.3354 - val_direction: 0.0026 - val_kl:
0.8863 - val_loss: -1.1618 - val_nll: -1.1986
Epoch 67/2000
6/6            4s 635ms/step - kl:
0.8856 - nll: -1.3731 - total_loss: -1.3374 - val_direction: 0.0031 - val_kl:
```

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0.8852 - val_loss: -1.1313 - val_nll: -1.1683
Epoch 68/2000
6/6            4s 634ms/step - kl:
0.8844 - nll: -1.3770 - total_loss: -1.3414 - val_direction: 0.0024 - val_kl:
0.8841 - val_loss: -1.1770 - val_nll: -1.2136
Epoch 69/2000
6/6            4s 662ms/step - kl:
0.8837 - nll: -1.3780 - total_loss: -1.3423 - val_direction: 0.0026 - val_kl:
0.8836 - val_loss: -1.1632 - val_nll: -1.1999
Epoch 70/2000
6/6            4s 637ms/step - kl:
0.8828 - nll: -1.3775 - total_loss: -1.3419 - val_direction: 0.0033 - val_kl:
0.8824 - val_loss: -1.1235 - val_nll: -1.1604
Epoch 71/2000
6/6            4s 633ms/step - kl:
0.8818 - nll: -1.3702 - total_loss: -1.3345 - val_direction: 0.0035 - val_kl:
0.8816 - val_loss: -1.1114 - val_nll: -1.1484
Epoch 72/2000
6/6            4s 633ms/step - kl:
0.8809 - nll: -1.3723 - total_loss: -1.3368 - val_direction: 0.0028 - val_kl:
0.8806 - val_loss: -1.1532 - val_nll: -1.1898
Epoch 73/2000
6/6            5s 805ms/step - kl:
0.8798 - nll: -1.3777 - total_loss: -1.3423 - val_direction: 0.0025 - val_kl:
0.8795 - val_loss: -1.1684 - val_nll: -1.2048
Epoch 74/2000
6/6            4s 688ms/step - kl:
0.8790 - nll: -1.3771 - total_loss: -1.3416 - val_direction: 0.0032 - val_kl:
0.8791 - val_loss: -1.1231 - val_nll: -1.1598
Epoch 75/2000
6/6            4s 722ms/step - kl:
0.8783 - nll: -1.3747 - total_loss: -1.3393 - val_direction: 0.0033 - val_kl:
0.8776 - val_loss: -1.1264 - val_nll: -1.1632
Epoch 76/2000
6/6            4s 656ms/step - kl:
0.8768 - nll: -1.3746 - total_loss: -1.3392 - val_direction: 0.0032 - val_kl:
0.8766 - val_loss: -1.1325 - val_nll: -1.1692
Epoch 77/2000
6/6            4s 657ms/step - kl:
0.8758 - nll: -1.3743 - total_loss: -1.3390 - val_direction: 0.0031 - val_kl:
0.8752 - val_loss: -1.1361 - val_nll: -1.1727
Epoch 78/2000
6/6            4s 638ms/step - kl:
0.8743 - nll: -1.3763 - total_loss: -1.3411 - val_direction: 0.0029 - val_kl:
0.8737 - val_loss: -1.1426 - val_nll: -1.1790
Epoch 79/2000
6/6            4s 630ms/step - kl:
0.8730 - nll: -1.3764 - total_loss: -1.3412 - val_direction: 0.0031 - val_kl:
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0.8727 - val_loss: -1.1323 - val_nll: -1.1688
Epoch 80/2000
6/6            4s 634ms/step - kl:
0.8719 - nll: -1.3790 - total_loss: -1.3439 - val_direction: 0.0025 - val_kl:
0.8713 - val_loss: -1.1715 - val_nll: -1.2076
Epoch 81/2000
6/6            4s 634ms/step - kl:
0.8706 - nll: -1.3797 - total_loss: -1.3446 - val_direction: 0.0033 - val_kl:
0.8703 - val_loss: -1.1174 - val_nll: -1.1538
Epoch 82/2000
6/6            5s 824ms/step - kl:
0.8696 - nll: -1.3706 - total_loss: -1.3354 - val_direction: 0.0035 - val_kl:
0.8690 - val_loss: -1.1092 - val_nll: -1.1457
Epoch 83/2000
6/6            5s 748ms/step - kl:
0.8680 - nll: -1.3767 - total_loss: -1.3417 - val_direction: 0.0022 - val_kl:
0.8675 - val_loss: -1.1885 - val_nll: -1.2243
Epoch 84/2000
6/6            4s 744ms/step - kl:
0.8667 - nll: -1.3782 - total_loss: -1.3433 - val_direction: 0.0028 - val_kl:
0.8663 - val_loss: -1.1493 - val_nll: -1.1854
Epoch 85/2000
6/6            4s 644ms/step - kl:
0.8654 - nll: -1.3763 - total_loss: -1.3415 - val_direction: 0.0031 - val_kl:
0.8647 - val_loss: -1.1366 - val_nll: -1.1728
Epoch 86/2000
6/6            4s 643ms/step - kl:
0.8637 - nll: -1.3745 - total_loss: -1.3397 - val_direction: 0.0029 - val_kl:
0.8630 - val_loss: -1.1494 - val_nll: -1.1854
Epoch 87/2000
6/6            4s 648ms/step - kl:
0.8622 - nll: -1.3751 - total_loss: -1.3403 - val_direction: 0.0030 - val_kl:
0.8618 - val_loss: -1.1429 - val_nll: -1.1788
Epoch 88/2000
6/6            4s 632ms/step - kl:
0.8609 - nll: -1.3738 - total_loss: -1.3391 - val_direction: 0.0031 - val_kl:
0.8602 - val_loss: -1.1339 - val_nll: -1.1699
Epoch 89/2000
6/6            4s 632ms/step - kl:
0.8593 - nll: -1.3746 - total_loss: -1.3399 - val_direction: 0.0029 - val_kl:
0.8586 - val_loss: -1.1512 - val_nll: -1.1870
Epoch 90/2000
6/6            4s 643ms/step - kl:
0.8578 - nll: -1.3797 - total_loss: -1.3452 - val_direction: 0.0024 - val_kl:
0.8575 - val_loss: -1.1733 - val_nll: -1.2088
Epoch 91/2000
6/6            4s 712ms/step - kl:
0.8568 - nll: -1.3797 - total_loss: -1.3452 - val_direction: 0.0025 - val_kl:
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0.8564 - val_loss: -1.1746 - val_nll: -1.2101
Epoch 92/2000
6/6            5s 828ms/step - kl:
0.8555 - nll: -1.3757 - total_loss: -1.3412 - val_direction: 0.0035 - val_kl:
0.8549 - val_loss: -1.1129 - val_nll: -1.1489
Epoch 93/2000
6/6            4s 714ms/step - kl:
0.8540 - nll: -1.3754 - total_loss: -1.3410 - val_direction: 0.0024 - val_kl:
0.8535 - val_loss: -1.1803 - val_nll: -1.2157
Epoch 94/2000
6/6            4s 726ms/step - kl:
0.8528 - nll: -1.3792 - total_loss: -1.3448 - val_direction: 0.0025 - val_kl:
0.8524 - val_loss: -1.1711 - val_nll: -1.2064
Epoch 95/2000
6/6            4s 647ms/step - kl:
0.8515 - nll: -1.3818 - total_loss: -1.3476 - val_direction: 0.0028 - val_kl:
0.8508 - val_loss: -1.1527 - val_nll: -1.1881
Epoch 96/2000
6/6            4s 645ms/step - kl:
0.8500 - nll: -1.3769 - total_loss: -1.3426 - val_direction: 0.0034 - val_kl:
0.8497 - val_loss: -1.1168 - val_nll: -1.1525
Epoch 97/2000
6/6            4s 637ms/step - kl:
0.8488 - nll: -1.3748 - total_loss: -1.3405 - val_direction: 0.0030 - val_kl:
0.8482 - val_loss: -1.1446 - val_nll: -1.1800
Epoch 98/2000
6/6            4s 631ms/step - kl:
0.8474 - nll: -1.3766 - total_loss: -1.3424 - val_direction: 0.0025 - val_kl:
0.8470 - val_loss: -1.1703 - val_nll: -1.2054
Epoch 99/2000
6/6            4s 652ms/step - kl:
0.8460 - nll: -1.3799 - total_loss: -1.3459 - val_direction: 0.0026 - val_kl:
0.8455 - val_loss: -1.1695 - val_nll: -1.2046
Epoch 100/2000
6/6            4s 635ms/step - kl:
0.8446 - nll: -1.3789 - total_loss: -1.3449 - val_direction: 0.0028 - val_kl:
0.8442 - val_loss: -1.1528 - val_nll: -1.1879
Epoch 101/2000
6/6            4s 769ms/step - kl:
0.8433 - nll: -1.3758 - total_loss: -1.3418 - val_direction: 0.0028 - val_kl:
0.8428 - val_loss: -1.1525 - val_nll: -1.1876
Epoch 102/2000
6/6            5s 750ms/step - kl:
0.8419 - nll: -1.3783 - total_loss: -1.3444 - val_direction: 0.0027 - val_kl:
0.8415 - val_loss: -1.1600 - val_nll: -1.1950
Epoch 103/2000
6/6            4s 675ms/step - kl:
0.8408 - nll: -1.3790 - total_loss: -1.3452 - val_direction: 0.0028 - val_kl:
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0.8405 - val_loss: -1.1531 - val_nll: -1.1881
Epoch 104/2000
6/6            4s 648ms/step - kl:
0.8396 - nll: -1.3765 - total_loss: -1.3427 - val_direction: 0.0031 - val_kl:
0.8389 - val_loss: -1.1393 - val_nll: -1.1744
Epoch 105/2000
6/6            4s 642ms/step - kl:
0.8380 - nll: -1.3785 - total_loss: -1.3447 - val_direction: 0.0023 - val_kl:
0.8376 - val_loss: -1.1861 - val_nll: -1.2207
Epoch 106/2000
6/6            4s 659ms/step - kl:
0.8370 - nll: -1.3787 - total_loss: -1.3450 - val_direction: 0.0028 - val_kl:
0.8368 - val_loss: -1.1526 - val_nll: -1.1875
Epoch 107/2000
6/6            4s 726ms/step - kl:
0.8358 - nll: -1.3771 - total_loss: -1.3435 - val_direction: 0.0031 - val_kl:
0.8352 - val_loss: -1.1384 - val_nll: -1.1734
Epoch 108/2000
6/6            4s 702ms/step - kl:
0.8343 - nll: -1.3779 - total_loss: -1.3443 - val_direction: 0.0024 - val_kl:
0.8339 - val_loss: -1.1744 - val_nll: -1.2089
Epoch 109/2000
6/6            4s 632ms/step - kl:
0.8332 - nll: -1.3794 - total_loss: -1.3458 - val_direction: 0.0025 - val_kl:
0.8328 - val_loss: -1.1684 - val_nll: -1.2029
Epoch 110/2000
6/6            4s 638ms/step - kl:
0.8318 - nll: -1.3792 - total_loss: -1.3458 - val_direction: 0.0028 - val_kl:
0.8314 - val_loss: -1.1565 - val_nll: -1.1911
Epoch 111/2000
6/6            5s 794ms/step - kl:
0.8306 - nll: -1.3766 - total_loss: -1.3431 - val_direction: 0.0025 - val_kl:
0.8302 - val_loss: -1.1693 - val_nll: -1.2038
Epoch 112/2000
6/6            4s 740ms/step - kl:
0.8292 - nll: -1.3798 - total_loss: -1.3464 - val_direction: 0.0028 - val_kl:
0.8287 - val_loss: -1.1548 - val_nll: -1.1893
Epoch 113/2000
6/6            4s 734ms/step - kl:
0.8277 - nll: -1.3767 - total_loss: -1.3434 - val_direction: 0.0027 - val_kl:
0.8271 - val_loss: -1.1625 - val_nll: -1.1970
Epoch 114/2000
6/6            4s 661ms/step - kl:
0.8263 - nll: -1.3770 - total_loss: -1.3437 - val_direction: 0.0028 - val_kl:
0.8260 - val_loss: -1.1539 - val_nll: -1.1883
Epoch 115/2000
6/6            4s 646ms/step - kl:
0.8251 - nll: -1.3802 - total_loss: -1.3469 - val_direction: 0.0026 - val_kl:
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0.8246 - val_loss: -1.1660 - val_nll: -1.2003
Epoch 116/2000
6/6            4s 641ms/step - kl:
0.8237 - nll: -1.3788 - total_loss: -1.3457 - val_direction: 0.0028 - val_kl:
0.8234 - val_loss: -1.1534 - val_nll: -1.1877
Epoch 117/2000
6/6            4s 694ms/step - kl:
0.8226 - nll: -1.3776 - total_loss: -1.3444 - val_direction: 0.0026 - val_kl:
0.8222 - val_loss: -1.1646 - val_nll: -1.1988
Epoch 118/2000
6/6            4s 709ms/step - kl:
0.8214 - nll: -1.3786 - total_loss: -1.3455 - val_direction: 0.0026 - val_kl:
0.8209 - val_loss: -1.1624 - val_nll: -1.1966
Epoch 119/2000
6/6            4s 632ms/step - kl:
0.8200 - nll: -1.3787 - total_loss: -1.3456 - val_direction: 0.0027 - val_kl:
0.8196 - val_loss: -1.1582 - val_nll: -1.1924
Epoch 120/2000
6/6            4s 705ms/step - kl:
0.8188 - nll: -1.3786 - total_loss: -1.3456 - val_direction: 0.0027 - val_kl:
0.8184 - val_loss: -1.1582 - val_nll: -1.1923
Epoch 121/2000
6/6            5s 839ms/step - kl:
0.8175 - nll: -1.3768 - total_loss: -1.3439 - val_direction: 0.0027 - val_kl:
0.8168 - val_loss: -1.1574 - val_nll: -1.1914
Epoch 122/2000
6/6            4s 709ms/step - kl:
0.8157 - nll: -1.3805 - total_loss: -1.3477 - val_direction: 0.0026 - val_kl:
0.8151 - val_loss: -1.1698 - val_nll: -1.2037
Epoch 123/2000
6/6            4s 729ms/step - kl:
0.8143 - nll: -1.3791 - total_loss: -1.3463 - val_direction: 0.0029 - val_kl:
0.8141 - val_loss: -1.1404 - val_nll: -1.1745
Epoch 124/2000
6/6            4s 649ms/step - kl:
0.8131 - nll: -1.3763 - total_loss: -1.3435 - val_direction: 0.0027 - val_kl:
0.8124 - val_loss: -1.1611 - val_nll: -1.1949
Epoch 125/2000
6/6            4s 644ms/step - kl:
0.8116 - nll: -1.3804 - total_loss: -1.3477 - val_direction: 0.0023 - val_kl:
0.8115 - val_loss: -1.1876 - val_nll: -1.2212
Epoch 126/2000
6/6            4s 637ms/step - kl:
0.8108 - nll: -1.3806 - total_loss: -1.3480 - val_direction: 0.0031 - val_kl:
0.8103 - val_loss: -1.1405 - val_nll: -1.1744
Epoch 127/2000
6/6            4s 635ms/step - kl:
0.8093 - nll: -1.3778 - total_loss: -1.3452 - val_direction: 0.0031 - val_kl:
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0.8088 - val_loss: -1.1394 - val_nll: -1.1733
Epoch 128/2000
6/6            4s 651ms/step - kl:
0.8080 - nll: -1.3762 - total_loss: -1.3437 - val_direction: 0.0024 - val_kl:
0.8076 - val_loss: -1.1775 - val_nll: -1.2110
Epoch 129/2000
6/6            4s 651ms/step - kl:
0.8067 - nll: -1.3787 - total_loss: -1.3463 - val_direction: 0.0028 - val_kl:
0.8062 - val_loss: -1.1587 - val_nll: -1.1924
Epoch 130/2000
6/6            4s 760ms/step - kl:
0.8053 - nll: -1.3792 - total_loss: -1.3468 - val_direction: 0.0030 - val_kl:
0.8050 - val_loss: -1.1466 - val_nll: -1.1803
Epoch 131/2000
6/6            5s 799ms/step - kl:
0.8042 - nll: -1.3767 - total_loss: -1.3443 - val_direction: 0.0029 - val_kl:
0.8038 - val_loss: -1.1485 - val_nll: -1.1821
Epoch 132/2000
6/6            4s 700ms/step - kl:
0.8030 - nll: -1.3790 - total_loss: -1.3467 - val_direction: 0.0027 - val_kl:
0.8026 - val_loss: -1.1596 - val_nll: -1.1931
Epoch 133/2000
6/6            4s 644ms/step - kl:
0.8017 - nll: -1.3789 - total_loss: -1.3466 - val_direction: 0.0028 - val_kl:
0.8014 - val_loss: -1.1553 - val_nll: -1.1888
Epoch 134/2000
6/6            4s 646ms/step - kl:
0.8005 - nll: -1.3786 - total_loss: -1.3464 - val_direction: 0.0026 - val_kl:
0.8002 - val_loss: -1.1645 - val_nll: -1.1979
Epoch 135/2000
6/6            4s 648ms/step - kl:
0.7994 - nll: -1.3799 - total_loss: -1.3477 - val_direction: 0.0028 - val_kl:
0.7992 - val_loss: -1.1547 - val_nll: -1.1881
Epoch 136/2000
6/6            4s 652ms/step - kl:
0.7983 - nll: -1.3758 - total_loss: -1.3436 - val_direction: 0.0032 - val_kl:
0.7979 - val_loss: -1.1320 - val_nll: -1.1655
Epoch 137/2000
6/6            4s 639ms/step - kl:
0.7969 - nll: -1.3764 - total_loss: -1.3443 - val_direction: 0.0027 - val_kl:
0.7963 - val_loss: -1.1610 - val_nll: -1.1942
Epoch 138/2000
6/6            4s 638ms/step - kl:
0.7955 - nll: -1.3808 - total_loss: -1.3487 - val_direction: 0.0024 - val_kl:
0.7953 - val_loss: -1.1753 - val_nll: -1.2083
Epoch 139/2000
6/6            4s 639ms/step - kl:
0.7945 - nll: -1.3797 - total_loss: -1.3477 - val_direction: 0.0032 - val_kl:
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0.7941 - val_loss: -1.1299 - val_nll: -1.1633
Epoch 140/2000
6/6            5s 814ms/step - kl:
0.7930 - nll: -1.3768 - total_loss: -1.3449 - val_direction: 0.0025 - val_kl:
0.7921 - val_loss: -1.1764 - val_nll: -1.2094
Epoch 141/2000
6/6            4s 689ms/step - kl:
0.7913 - nll: -1.3819 - total_loss: -1.3500 - val_direction: 0.0024 - val_kl:
0.7913 - val_loss: -1.1751 - val_nll: -1.2080
Epoch 142/2000
6/6            4s 726ms/step - kl:
0.7904 - nll: -1.3792 - total_loss: -1.3474 - val_direction: 0.0033 - val_kl:
0.7898 - val_loss: -1.1285 - val_nll: -1.1617
Epoch 143/2000
6/6            4s 668ms/step - kl:
0.7887 - nll: -1.3774 - total_loss: -1.3456 - val_direction: 0.0028 - val_kl:
0.7883 - val_loss: -1.1582 - val_nll: -1.1911
Epoch 144/2000
6/6            4s 649ms/step - kl:
0.7878 - nll: -1.3795 - total_loss: -1.3478 - val_direction: 0.0023 - val_kl:
0.7878 - val_loss: -1.1830 - val_nll: -1.2157
Epoch 145/2000
6/6            4s 649ms/step - kl:
0.7870 - nll: -1.3811 - total_loss: -1.3495 - val_direction: 0.0024 - val_kl:
0.7864 - val_loss: -1.1787 - val_nll: -1.2113
Epoch 146/2000
6/6            4s 633ms/step - kl:
0.7855 - nll: -1.3810 - total_loss: -1.3493 - val_direction: 0.0029 - val_kl:
0.7854 - val_loss: -1.1511 - val_nll: -1.1840
Epoch 147/2000
6/6            4s 639ms/step - kl:
0.7846 - nll: -1.3769 - total_loss: -1.3453 - val_direction: 0.0029 - val_kl:
0.7844 - val_loss: -1.1536 - val_nll: -1.1865
Epoch 148/2000
6/6            4s 633ms/step - kl:
0.7836 - nll: -1.3815 - total_loss: -1.3500 - val_direction: 0.0025 - val_kl:
0.7833 - val_loss: -1.1715 - val_nll: -1.2041
Epoch 149/2000
6/6            4s 636ms/step - kl:
0.7825 - nll: -1.3795 - total_loss: -1.3480 - val_direction: 0.0028 - val_kl:
0.7824 - val_loss: -1.1549 - val_nll: -1.1876
Epoch 150/2000
6/6            5s 836ms/step - kl:
0.7816 - nll: -1.3792 - total_loss: -1.3477 - val_direction: 0.0026 - val_kl:
0.7815 - val_loss: -1.1706 - val_nll: -1.2032
Epoch 151/2000
6/6            5s 752ms/step - kl:
0.7807 - nll: -1.3780 - total_loss: -1.3465 - val_direction: 0.0027 - val_kl:
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0.7805 - val_loss: -1.1634 - val_nll: -1.1960
Epoch 152/2000
6/6            4s 716ms/step - kl:
0.7796 - nll: -1.3785 - total_loss: -1.3471 - val_direction: 0.0032 - val_kl:
0.7795 - val_loss: -1.1327 - val_nll: -1.1655
Epoch 153/2000
6/6            4s 645ms/step - kl:
0.7788 - nll: -1.3756 - total_loss: -1.3442 - val_direction: 0.0031 - val_kl:
0.7788 - val_loss: -1.1394 - val_nll: -1.1720
Epoch 154/2000
6/6            4s 645ms/step - kl:
0.7778 - nll: -1.3762 - total_loss: -1.3448 - val_direction: 0.0029 - val_kl:
0.7775 - val_loss: -1.1505 - val_nll: -1.1830
Epoch 155/2000
6/6            4s 640ms/step - kl:
0.7768 - nll: -1.3782 - total_loss: -1.3469 - val_direction: 0.0030 - val_kl:
0.7768 - val_loss: -1.1464 - val_nll: -1.1790
Epoch 156/2000
6/6            4s 631ms/step - kl:
0.7759 - nll: -1.3764 - total_loss: -1.3451 - val_direction: 0.0029 - val_kl:
0.7755 - val_loss: -1.1534 - val_nll: -1.1859
Epoch 157/2000
6/6            4s 633ms/step - kl:
0.7746 - nll: -1.3777 - total_loss: -1.3464 - val_direction: 0.0026 - val_kl:
0.7743 - val_loss: -1.1726 - val_nll: -1.2048
Epoch 158/2000
6/6            4s 650ms/step - kl:
0.7736 - nll: -1.3813 - total_loss: -1.3502 - val_direction: 0.0023 - val_kl:
0.7735 - val_loss: -1.1902 - val_nll: -1.2222
Epoch 159/2000
6/6            4s 663ms/step - kl:
0.7725 - nll: -1.3798 - total_loss: -1.3488 - val_direction: 0.0029 - val_kl:
0.7722 - val_loss: -1.1512 - val_nll: -1.1835
Epoch 160/2000
6/6            5s 834ms/step - kl:
0.7713 - nll: -1.3764 - total_loss: -1.3453 - val_direction: 0.0028 - val_kl:
0.7709 - val_loss: -1.1560 - val_nll: -1.1882
Epoch 161/2000
6/6            4s 664ms/step - kl:
0.7699 - nll: -1.3788 - total_loss: -1.3478 - val_direction: 0.0025 - val_kl:
0.7698 - val_loss: -1.1772 - val_nll: -1.2093
Epoch 162/2000
6/6            4s 658ms/step - kl:
0.7691 - nll: -1.3797 - total_loss: -1.3487 - val_direction: 0.0026 - val_kl:
0.7691 - val_loss: -1.1682 - val_nll: -1.2003
Epoch 163/2000
6/6            4s 638ms/step - kl:
0.7682 - nll: -1.3799 - total_loss: -1.3489 - val_direction: 0.0028 - val_kl:
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0.7680 - val_loss: -1.1538 - val_nll: -1.1859
Epoch 164/2000
6/6            4s 643ms/step - kl:
0.7673 - nll: -1.3785 - total_loss: -1.3476 - val_direction: 0.0027 - val_kl:
0.7672 - val_loss: -1.1628 - val_nll: -1.1949
Epoch 165/2000
6/6            4s 633ms/step - kl:
0.7664 - nll: -1.3778 - total_loss: -1.3469 - val_direction: 0.0027 - val_kl:
0.7662 - val_loss: -1.1586 - val_nll: -1.1906
Epoch 166/2000
6/6            4s 648ms/step - kl:
0.7653 - nll: -1.3800 - total_loss: -1.3492 - val_direction: 0.0028 - val_kl:
0.7654 - val_loss: -1.1603 - val_nll: -1.1923
Epoch 167/2000
6/6            4s 635ms/step - kl:
0.7647 - nll: -1.3767 - total_loss: -1.3459 - val_direction: 0.0030 - val_kl:
0.7644 - val_loss: -1.1426 - val_nll: -1.1747
Epoch 168/2000
6/6            4s 641ms/step - kl:
0.7633 - nll: -1.3792 - total_loss: -1.3485 - val_direction: 0.0025 - val_kl:
0.7628 - val_loss: -1.1711 - val_nll: -1.2029
Epoch 169/2000
6/6            5s 810ms/step - kl:
0.7621 - nll: -1.3795 - total_loss: -1.3488 - val_direction: 0.0028 - val_kl:
0.7620 - val_loss: -1.1591 - val_nll: -1.1910
Epoch 170/2000
6/6            4s 687ms/step - kl:
0.7610 - nll: -1.3789 - total_loss: -1.3482 - val_direction: 0.0032 - val_kl:
0.7607 - val_loss: -1.1349 - val_nll: -1.1670
Epoch 171/2000
6/6            4s 717ms/step - kl:
0.7600 - nll: -1.3742 - total_loss: -1.3435 - val_direction: 0.0028 - val_kl:
0.7599 - val_loss: -1.1612 - val_nll: -1.1930
Epoch 172/2000
6/6            4s 643ms/step - kl:
0.7590 - nll: -1.3788 - total_loss: -1.3482 - val_direction: 0.0022 - val_kl:
0.7587 - val_loss: -1.1954 - val_nll: -1.2268
Epoch 173/2000
6/6            4s 660ms/step - kl:
0.7579 - nll: -1.3807 - total_loss: -1.3501 - val_direction: 0.0026 - val_kl:
0.7578 - val_loss: -1.1685 - val_nll: -1.2001
Epoch 174/2000
6/6            4s 643ms/step - kl:
0.7569 - nll: -1.3800 - total_loss: -1.3495 - val_direction: 0.0031 - val_kl:
0.7568 - val_loss: -1.1404 - val_nll: -1.1722
Epoch 175/2000
6/6            4s 635ms/step - kl:
0.7560 - nll: -1.3733 - total_loss: -1.3428 - val_direction: 0.0034 - val_kl:
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0.7557 - val_loss: -1.1221 - val_nll: -1.1540
Epoch 176/2000
6/6            4s 629ms/step - kl:
0.7547 - nll: -1.3761 - total_loss: -1.3457 - val_direction: 0.0025 - val_kl:
0.7544 - val_loss: -1.1784 - val_nll: -1.2098
Epoch 177/2000
6/6            4s 636ms/step - kl:
0.7537 - nll: -1.3822 - total_loss: -1.3518 - val_direction: 0.0023 - val_kl:
0.7539 - val_loss: -1.1860 - val_nll: -1.2173
Epoch 178/2000
6/6            4s 766ms/step - kl:
0.7533 - nll: -1.3796 - total_loss: -1.3492 - val_direction: 0.0031 - val_kl:
0.7534 - val_loss: -1.1402 - val_nll: -1.1718
Epoch 179/2000
6/6            4s 725ms/step - kl:
0.7523 - nll: -1.3760 - total_loss: -1.3457 - val_direction: 0.0031 - val_kl:
0.7521 - val_loss: -1.1408 - val_nll: -1.1724
Epoch 180/2000
6/6            4s 660ms/step - kl:
0.7514 - nll: -1.3778 - total_loss: -1.3475 - val_direction: 0.0025 - val_kl:
0.7516 - val_loss: -1.1749 - val_nll: -1.2062
Epoch 181/2000
6/6            4s 708ms/step - kl:
0.7508 - nll: -1.3810 - total_loss: -1.3507 - val_direction: 0.0026 - val_kl:
0.7507 - val_loss: -1.1722 - val_nll: -1.2035
Epoch 182/2000
6/6            4s 642ms/step - kl:
0.7498 - nll: -1.3776 - total_loss: -1.3474 - val_direction: 0.0030 - val_kl:
0.7495 - val_loss: -1.1461 - val_nll: -1.1776
Epoch 183/2000
6/6            4s 650ms/step - kl:
0.7487 - nll: -1.3785 - total_loss: -1.3483 - val_direction: 0.0024 - val_kl:
0.7487 - val_loss: -1.1781 - val_nll: -1.2093
Epoch 184/2000
6/6            4s 633ms/step - kl:
0.7479 - nll: -1.3787 - total_loss: -1.3486 - val_direction: 0.0027 - val_kl:
0.7480 - val_loss: -1.1600 - val_nll: -1.1913
Epoch 185/2000
6/6            4s 634ms/step - kl:
0.7471 - nll: -1.3772 - total_loss: -1.3471 - val_direction: 0.0027 - val_kl:
0.7467 - val_loss: -1.1653 - val_nll: -1.1965
Epoch 186/2000
6/6            4s 633ms/step - kl:
0.7457 - nll: -1.3814 - total_loss: -1.3514 - val_direction: 0.0025 - val_kl:
0.7456 - val_loss: -1.1739 - val_nll: -1.2050
Epoch 187/2000
6/6            4s 637ms/step - kl:
0.7452 - nll: -1.3805 - total_loss: -1.3505 - val_direction: 0.0029 - val_kl:
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0.7453 - val_loss: -1.1461 - val_nll: -1.1774
Epoch 188/2000
6/6            5s 833ms/step - kl:
0.7444 - nll: -1.3749 - total_loss: -1.3448 - val_direction: 0.0031 - val_kl:
0.7440 - val_loss: -1.1418 - val_nll: -1.1731
Epoch 189/2000
6/6            4s 713ms/step - kl:
0.7433 - nll: -1.3796 - total_loss: -1.3496 - val_direction: 0.0024 - val_kl:
0.7434 - val_loss: -1.1820 - val_nll: -1.2129
Epoch 190/2000
6/6            4s 721ms/step - kl:
0.7428 - nll: -1.3782 - total_loss: -1.3483 - val_direction: 0.0029 - val_kl:
0.7428 - val_loss: -1.1469 - val_nll: -1.1781
Epoch 191/2000
6/6            4s 643ms/step - kl:
0.7417 - nll: -1.3763 - total_loss: -1.3464 - val_direction: 0.0029 - val_kl:
0.7412 - val_loss: -1.1584 - val_nll: -1.1895
Epoch 192/2000
6/6            4s 649ms/step - kl:
0.7403 - nll: -1.3776 - total_loss: -1.3478 - val_direction: 0.0025 - val_kl:
0.7404 - val_loss: -1.1794 - val_nll: -1.2102
Epoch 193/2000
6/6            4s 640ms/step - kl:
0.7397 - nll: -1.3810 - total_loss: -1.3513 - val_direction: 0.0027 - val_kl:
0.7397 - val_loss: -1.1619 - val_nll: -1.1929
Epoch 194/2000
6/6            4s 633ms/step - kl:
0.7389 - nll: -1.3793 - total_loss: -1.3496 - val_direction: 0.0029 - val_kl:
0.7390 - val_loss: -1.1513 - val_nll: -1.1823
Epoch 195/2000
6/6            4s 633ms/step - kl:
0.7382 - nll: -1.3791 - total_loss: -1.3493 - val_direction: 0.0027 - val_kl:
0.7382 - val_loss: -1.1651 - val_nll: -1.1959
Epoch 196/2000
6/6            4s 654ms/step - kl:
0.7376 - nll: -1.3772 - total_loss: -1.3474 - val_direction: 0.0027 - val_kl:
0.7377 - val_loss: -1.1601 - val_nll: -1.1910
Epoch 197/2000
6/6            4s 712ms/step - kl:
0.7368 - nll: -1.3796 - total_loss: -1.3500 - val_direction: 0.0028 - val_kl:
0.7368 - val_loss: -1.1622 - val_nll: -1.1930
Epoch 198/2000
6/6            5s 808ms/step - kl:
0.7360 - nll: -1.3788 - total_loss: -1.3492 - val_direction: 0.0029 - val_kl:
0.7358 - val_loss: -1.1521 - val_nll: -1.1830
Epoch 199/2000
6/6            4s 675ms/step - kl:
0.7345 - nll: -1.3801 - total_loss: -1.3506 - val_direction: 0.0029 - val_kl:
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0.7341 - val_loss: -1.1576 - val_nll: -1.1884
Epoch 200/2000
6/6            4s 673ms/step - kl:
0.7334 - nll: -1.3784 - total_loss: -1.3489 - val_direction: 0.0029 - val_kl:
0.7335 - val_loss: -1.1505 - val_nll: -1.1813
Epoch 201/2000
6/6            4s 647ms/step - kl:
0.7324 - nll: -1.3753 - total_loss: -1.3457 - val_direction: 0.0030 - val_kl:
0.7320 - val_loss: -1.1473 - val_nll: -1.1781
Epoch 202/2000
6/6            4s 647ms/step - kl:
0.7312 - nll: -1.3769 - total_loss: -1.3474 - val_direction: 0.0027 - val_kl:
0.7313 - val_loss: -1.1637 - val_nll: -1.1943
Epoch 203/2000
6/6            4s 653ms/step - kl:
0.7305 - nll: -1.3793 - total_loss: -1.3498 - val_direction: 0.0027 - val_kl:
0.7305 - val_loss: -1.1627 - val_nll: -1.1933
Epoch 204/2000
6/6            4s 640ms/step - kl:
0.7298 - nll: -1.3792 - total_loss: -1.3498 - val_direction: 0.0031 - val_kl:
0.7299 - val_loss: -1.1386 - val_nll: -1.1693
Epoch 205/2000
6/6            4s 658ms/step - kl:
0.7289 - nll: -1.3780 - total_loss: -1.3486 - val_direction: 0.0029 - val_kl:
0.7286 - val_loss: -1.1537 - val_nll: -1.1843
Epoch 206/2000
6/6            4s 695ms/step - kl:
0.7278 - nll: -1.3791 - total_loss: -1.3498 - val_direction: 0.0024 - val_kl:
0.7278 - val_loss: -1.1825 - val_nll: -1.2129
Epoch 207/2000
6/6            4s 690ms/step - kl:
0.7269 - nll: -1.3812 - total_loss: -1.3519 - val_direction: 0.0026 - val_kl:
0.7269 - val_loss: -1.1706 - val_nll: -1.2009
Epoch 208/2000
6/6            4s 674ms/step - kl:
0.7263 - nll: -1.3811 - total_loss: -1.3518 - val_direction: 0.0027 - val_kl:
0.7265 - val_loss: -1.1644 - val_nll: -1.1948
Epoch 209/2000
6/6            4s 643ms/step - kl:
0.7258 - nll: -1.3788 - total_loss: -1.3495 - val_direction: 0.0031 - val_kl:
0.7262 - val_loss: -1.1416 - val_nll: -1.1722
Epoch 210/2000
6/6            4s 639ms/step - kl:
0.7255 - nll: -1.3735 - total_loss: -1.3442 - val_direction: 0.0029 - val_kl:
0.7256 - val_loss: -1.1560 - val_nll: -1.1865
Epoch 211/2000
6/6            4s 724ms/step - kl:
0.7247 - nll: -1.3794 - total_loss: -1.3502 - val_direction: 0.0024 - val_kl:
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0.7249 - val_loss: -1.1857 - val_nll: -1.2159
Epoch 212/2000
6/6            5s 775ms/step - kl:
0.7244 - nll: -1.3782 - total_loss: -1.3490 - val_direction: 0.0030 - val_kl:
0.7245 - val_loss: -1.1429 - val_nll: -1.1734
Epoch 213/2000
6/6            4s 646ms/step - kl:
0.7234 - nll: -1.3745 - total_loss: -1.3453 - val_direction: 0.0030 - val_kl:
0.7231 - val_loss: -1.1522 - val_nll: -1.1826
Epoch 214/2000
6/6            4s 721ms/step - kl:
0.7224 - nll: -1.3775 - total_loss: -1.3483 - val_direction: 0.0027 - val_kl:
0.7229 - val_loss: -1.1624 - val_nll: -1.1927
Epoch 215/2000
6/6            4s 644ms/step - kl:
0.7221 - nll: -1.3775 - total_loss: -1.3484 - val_direction: 0.0028 - val_kl:
0.7218 - val_loss: -1.1636 - val_nll: -1.1938
Epoch 216/2000
6/6            4s 645ms/step - kl:
0.7209 - nll: -1.3804 - total_loss: -1.3514 - val_direction: 0.0025 - val_kl:
0.7210 - val_loss: -1.1823 - val_nll: -1.2124
Epoch 217/2000
6/6            4s 640ms/step - kl:
0.7205 - nll: -1.3781 - total_loss: -1.3490 - val_direction: 0.0030 - val_kl:
0.7208 - val_loss: -1.1479 - val_nll: -1.1783
Epoch 218/2000
6/6            4s 650ms/step - kl:
0.7197 - nll: -1.3776 - total_loss: -1.3485 - val_direction: 0.0029 - val_kl:
0.7193 - val_loss: -1.1567 - val_nll: -1.1869
Epoch 219/2000
6/6            4s 639ms/step - kl:
0.7186 - nll: -1.3786 - total_loss: -1.3496 - val_direction: 0.0025 - val_kl:
0.7187 - val_loss: -1.1733 - val_nll: -1.2034
Epoch 220/2000
6/6            4s 634ms/step - kl:
0.7178 - nll: -1.3796 - total_loss: -1.3507 - val_direction: 0.0026 - val_kl:
0.7179 - val_loss: -1.1701 - val_nll: -1.2001
Epoch 221/2000
6/6            4s 673ms/step - kl:
0.7169 - nll: -1.3792 - total_loss: -1.3503 - val_direction: 0.0028 - val_kl:
0.7168 - val_loss: -1.1576 - val_nll: -1.1876
Epoch 222/2000
6/6            5s 827ms/step - kl:
0.7160 - nll: -1.3774 - total_loss: -1.3485 - val_direction: 0.0028 - val_kl:
0.7160 - val_loss: -1.1595 - val_nll: -1.1895
Epoch 223/2000
6/6            4s 731ms/step - kl:
0.7152 - nll: -1.3809 - total_loss: -1.3521 - val_direction: 0.0026 - val_kl:
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0.7153 - val_loss: -1.1729 - val_nll: -1.2028
Epoch 224/2000
6/6            4s 723ms/step - kl:
0.7146 - nll: -1.3789 - total_loss: -1.3501 - val_direction: 0.0031 - val_kl:
0.7147 - val_loss: -1.1386 - val_nll: -1.1688
Epoch 225/2000
6/6            4s 659ms/step - kl:
0.7136 - nll: -1.3779 - total_loss: -1.3492 - val_direction: 0.0030 - val_kl:
0.7132 - val_loss: -1.1473 - val_nll: -1.1773
Epoch 226/2000
6/6            4s 660ms/step - kl:
0.7124 - nll: -1.3789 - total_loss: -1.3502 - val_direction: 0.0029 - val_kl:
0.7127 - val_loss: -1.1491 - val_nll: -1.1790
Epoch 227/2000
6/6            4s 636ms/step - kl:
0.7119 - nll: -1.3771 - total_loss: -1.3483 - val_direction: 0.0029 - val_kl:
0.7119 - val_loss: -1.1586 - val_nll: -1.1885
Epoch 228/2000
6/6            4s 636ms/step - kl:
0.7110 - nll: -1.3792 - total_loss: -1.3505 - val_direction: 0.0025 - val_kl:
0.7110 - val_loss: -1.1771 - val_nll: -1.2068
Epoch 229/2000
6/6            4s 636ms/step - kl:
0.7103 - nll: -1.3797 - total_loss: -1.3510 - val_direction: 0.0027 - val_kl:
0.7103 - val_loss: -1.1657 - val_nll: -1.1955
Epoch 230/2000
6/6            4s 635ms/step - kl:
0.7096 - nll: -1.3783 - total_loss: -1.3497 - val_direction: 0.0028 - val_kl:
0.7098 - val_loss: -1.1618 - val_nll: -1.1915
Epoch 231/2000
6/6            4s 730ms/step - kl:
0.7090 - nll: -1.3776 - total_loss: -1.3490 - val_direction: 0.0028 - val_kl:
0.7092 - val_loss: -1.1562 - val_nll: -1.1860
Epoch 232/2000
6/6            5s 822ms/step - kl:
0.7084 - nll: -1.3773 - total_loss: -1.3487 - val_direction: 0.0028 - val_kl:
0.7087 - val_loss: -1.1666 - val_nll: -1.1963
Epoch 233/2000
6/6            4s 676ms/step - kl:
0.7082 - nll: -1.3774 - total_loss: -1.3488 - val_direction: 0.0027 - val_kl:
0.7087 - val_loss: -1.1638 - val_nll: -1.1935
Epoch 234/2000
6/6            4s 721ms/step - kl:
0.7079 - nll: -1.3805 - total_loss: -1.3520 - val_direction: 0.0027 - val_kl:
0.7080 - val_loss: -1.1614 - val_nll: -1.1911
Epoch 235/2000
6/6            4s 641ms/step - kl:
0.7074 - nll: -1.3765 - total_loss: -1.3479 - val_direction: 0.0031 - val_kl:
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0.7077 - val_loss: -1.1429 - val_nll: -1.1727
Epoch 236/2000
6/6            4s 643ms/step - kl:
0.7068 - nll: -1.3774 - total_loss: -1.3489 - val_direction: 0.0030 - val_kl:
0.7067 - val_loss: -1.1545 - val_nll: -1.1842
Epoch 237/2000
6/6            4s 635ms/step - kl:
0.7059 - nll: -1.3798 - total_loss: -1.3513 - val_direction: 0.0025 - val_kl:
0.7063 - val_loss: -1.1791 - val_nll: -1.2086
Epoch 238/2000
6/6            4s 630ms/step - kl:
0.7057 - nll: -1.3791 - total_loss: -1.3506 - val_direction: 0.0031 - val_kl:
0.7059 - val_loss: -1.1407 - val_nll: -1.1705
Epoch 239/2000
6/6            4s 635ms/step - kl:
0.7048 - nll: -1.3777 - total_loss: -1.3493 - val_direction: 0.0031 - val_kl:
0.7045 - val_loss: -1.1430 - val_nll: -1.1728
Epoch 240/2000
6/6            4s 644ms/step - kl:
0.7037 - nll: -1.3742 - total_loss: -1.3457 - val_direction: 0.0030 - val_kl:
0.7039 - val_loss: -1.1487 - val_nll: -1.1783
Epoch 241/2000
6/6            4s 663ms/step - kl:
0.7029 - nll: -1.3786 - total_loss: -1.3502 - val_direction: 0.0025 - val_kl:
0.7029 - val_loss: -1.1787 - val_nll: -1.2081
Epoch 242/2000
6/6            5s 824ms/step - kl:
0.7025 - nll: -1.3808 - total_loss: -1.3525 - val_direction: 0.0028 - val_kl:
0.7031 - val_loss: -1.1551 - val_nll: -1.1847
Epoch 243/2000
6/6            4s 738ms/step - kl:
0.7023 - nll: -1.3769 - total_loss: -1.3486 - val_direction: 0.0034 - val_kl:
0.7020 - val_loss: -1.1241 - val_nll: -1.1539
Epoch 244/2000
6/6            4s 673ms/step - kl:
0.7008 - nll: -1.3736 - total_loss: -1.3452 - val_direction: 0.0026 - val_kl:
0.7007 - val_loss: -1.1783 - val_nll: -1.2076
Epoch 245/2000
6/6            4s 648ms/step - kl:
0.7001 - nll: -1.3823 - total_loss: -1.3541 - val_direction: 0.0021 - val_kl:
0.7005 - val_loss: -1.1964 - val_nll: -1.2255
Epoch 246/2000
6/6            4s 644ms/step - kl:
0.6995 - nll: -1.3810 - total_loss: -1.3529 - val_direction: 0.0030 - val_kl:
0.6991 - val_loss: -1.1425 - val_nll: -1.1720
Epoch 247/2000
6/6            4s 699ms/step - kl:
0.6980 - nll: -1.3773 - total_loss: -1.3491 - val_direction: 0.0034 - val_kl:
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0.6981 - val_loss: -1.1280 - val_nll: -1.1576
Epoch 248/2000
6/6            4s 674ms/step - kl:
0.6972 - nll: -1.3734 - total_loss: -1.3452 - val_direction: 0.0028 - val_kl:
0.6970 - val_loss: -1.1633 - val_nll: -1.1926
Epoch 249/2000
6/6            4s 649ms/step - kl:
0.6963 - nll: -1.3800 - total_loss: -1.3519 - val_direction: 0.0022 - val_kl:
0.6965 - val_loss: -1.1970 - val_nll: -1.2259
Epoch 250/2000
6/6            4s 637ms/step - kl:
0.6959 - nll: -1.3792 - total_loss: -1.3512 - val_direction: 0.0031 - val_kl:
0.6963 - val_loss: -1.1414 - val_nll: -1.1708
Epoch 251/2000
6/6            4s 722ms/step - kl:
0.6952 - nll: -1.3782 - total_loss: -1.3501 - val_direction: 0.0028 - val_kl:
0.6953 - val_loss: -1.1605 - val_nll: -1.1897
Epoch 252/2000
6/6            5s 794ms/step - kl:
0.6947 - nll: -1.3780 - total_loss: -1.3500 - val_direction: 0.0028 - val_kl:
0.6950 - val_loss: -1.1613 - val_nll: -1.1905
Epoch 253/2000
6/6            4s 684ms/step - kl:
0.6941 - nll: -1.3811 - total_loss: -1.3531 - val_direction: 0.0027 - val_kl:
0.6943 - val_loss: -1.1697 - val_nll: -1.1989
Epoch 254/2000
6/6            4s 719ms/step - kl:
0.6937 - nll: -1.3772 - total_loss: -1.3492 - val_direction: 0.0031 - val_kl:
0.6938 - val_loss: -1.1459 - val_nll: -1.1752
Epoch 255/2000
6/6            4s 670ms/step - kl:
0.6926 - nll: -1.3771 - total_loss: -1.3492 - val_direction: 0.0025 - val_kl:
0.6924 - val_loss: -1.1794 - val_nll: -1.2084
Epoch 256/2000
6/6            4s 647ms/step - kl:
0.6917 - nll: -1.3809 - total_loss: -1.3530 - val_direction: 0.0026 - val_kl:
0.6920 - val_loss: -1.1721 - val_nll: -1.2011
Epoch 257/2000
6/6            4s 638ms/step - kl:
0.6910 - nll: -1.3796 - total_loss: -1.3518 - val_direction: 0.0030 - val_kl:
0.6907 - val_loss: -1.1464 - val_nll: -1.1755
Epoch 258/2000
6/6            4s 631ms/step - kl:
0.6896 - nll: -1.3766 - total_loss: -1.3487 - val_direction: 0.0029 - val_kl:
0.6894 - val_loss: -1.1581 - val_nll: -1.1871
Epoch 259/2000
6/6            4s 635ms/step - kl:
0.6886 - nll: -1.3780 - total_loss: -1.3502 - val_direction: 0.0026 - val_kl:
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0.6886 - val_loss: -1.1696 - val_nll: -1.1984
Epoch 260/2000
6/6            4s 634ms/step - kl:
0.6878 - nll: -1.3797 - total_loss: -1.3520 - val_direction: 0.0028 - val_kl:
0.6880 - val_loss: -1.1603 - val_nll: -1.1893
Epoch 261/2000
6/6            4s 638ms/step - kl:
0.6874 - nll: -1.3794 - total_loss: -1.3517 - val_direction: 0.0027 - val_kl:
0.6878 - val_loss: -1.1653 - val_nll: -1.1941
Epoch 262/2000
6/6            5s 796ms/step - kl:
0.6873 - nll: -1.3771 - total_loss: -1.3494 - val_direction: 0.0029 - val_kl:
0.6876 - val_loss: -1.1582 - val_nll: -1.1871
Epoch 263/2000
6/6            5s 783ms/step - kl:
0.6868 - nll: -1.3803 - total_loss: -1.3527 - val_direction: 0.0029 - val_kl:
0.6872 - val_loss: -1.1567 - val_nll: -1.1856
Epoch 264/2000
6/6            4s 650ms/step - kl:
0.6866 - nll: -1.3777 - total_loss: -1.3500 - val_direction: 0.0030 - val_kl:
0.6868 - val_loss: -1.1454 - val_nll: -1.1744
Epoch 265/2000
6/6            4s 669ms/step - kl:
0.6857 - nll: -1.3792 - total_loss: -1.3516 - val_direction: 0.0026 - val_kl:
0.6857 - val_loss: -1.1716 - val_nll: -1.2004
Epoch 266/2000
6/6            4s 643ms/step - kl:
0.6852 - nll: -1.3783 - total_loss: -1.3506 - val_direction: 0.0029 - val_kl:
0.6857 - val_loss: -1.1523 - val_nll: -1.1812
Epoch 267/2000
6/6            4s 641ms/step - kl:
0.6851 - nll: -1.3787 - total_loss: -1.3511 - val_direction: 0.0029 - val_kl:
0.6854 - val_loss: -1.1539 - val_nll: -1.1827
Epoch 268/2000
6/6            4s 674ms/step - kl:
0.6846 - nll: -1.3794 - total_loss: -1.3517 - val_direction: 0.0030 - val_kl:
0.6849 - val_loss: -1.1474 - val_nll: -1.1763
Epoch 269/2000
6/6            4s 710ms/step - kl:
0.6842 - nll: -1.3767 - total_loss: -1.3491 - val_direction: 0.0029 - val_kl:
0.6843 - val_loss: -1.1560 - val_nll: -1.1848
Epoch 270/2000
6/6            4s 659ms/step - kl:
0.6833 - nll: -1.3784 - total_loss: -1.3508 - val_direction: 0.0027 - val_kl:
0.6833 - val_loss: -1.1700 - val_nll: -1.1987
Epoch 271/2000
6/6            4s 643ms/step - kl:
0.6827 - nll: -1.3794 - total_loss: -1.3519 - val_direction: 0.0028 - val_kl:
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0.6831 - val_loss: -1.1610 - val_nll: -1.1897
Epoch 272/2000
6/6            4s 746ms/step - kl:
0.6824 - nll: -1.3781 - total_loss: -1.3506 - val_direction: 0.0030 - val_kl:
0.6825 - val_loss: -1.1505 - val_nll: -1.1793
Epoch 273/2000
6/6            5s 812ms/step - kl:
0.6815 - nll: -1.3785 - total_loss: -1.3511 - val_direction: 0.0031 - val_kl:
0.6818 - val_loss: -1.1418 - val_nll: -1.1706
Epoch 274/2000
6/6            4s 679ms/step - kl:
0.6812 - nll: -1.3723 - total_loss: -1.3447 - val_direction: 0.0034 - val_kl:
0.6815 - val_loss: -1.1256 - val_nll: -1.1546
Epoch 275/2000
6/6            4s 711ms/step - kl:
0.6804 - nll: -1.3785 - total_loss: -1.3511 - val_direction: 0.0021 - val_kl:
0.6805 - val_loss: -1.2043 - val_nll: -1.2326
Epoch 276/2000
6/6            4s 644ms/step - kl:
0.6802 - nll: -1.3811 - total_loss: -1.3537 - val_direction: 0.0028 - val_kl:
0.6810 - val_loss: -1.1578 - val_nll: -1.1864
Epoch 277/2000
6/6            4s 664ms/step - kl:
0.6802 - nll: -1.3762 - total_loss: -1.3487 - val_direction: 0.0031 - val_kl:
0.6799 - val_loss: -1.1411 - val_nll: -1.1698
Epoch 278/2000
6/6            4s 724ms/step - kl:
0.6789 - nll: -1.3787 - total_loss: -1.3513 - val_direction: 0.0023 - val_kl:
0.6790 - val_loss: -1.1936 - val_nll: -1.2219
Epoch 279/2000
6/6            4s 669ms/step - kl:
0.6786 - nll: -1.3801 - total_loss: -1.3527 - val_direction: 0.0027 - val_kl:
0.6791 - val_loss: -1.1651 - val_nll: -1.1936
Epoch 280/2000
6/6            4s 658ms/step - kl:
0.6780 - nll: -1.3788 - total_loss: -1.3514 - val_direction: 0.0029 - val_kl:
0.6777 - val_loss: -1.1569 - val_nll: -1.1854
Epoch 281/2000
6/6            4s 633ms/step - kl:
0.6770 - nll: -1.3775 - total_loss: -1.3502 - val_direction: 0.0028 - val_kl:
0.6775 - val_loss: -1.1625 - val_nll: -1.1910
Epoch 282/2000
6/6            4s 634ms/step - kl:
0.6767 - nll: -1.3794 - total_loss: -1.3521 - val_direction: 0.0028 - val_kl:
0.6767 - val_loss: -1.1620 - val_nll: -1.1904
Epoch 283/2000
6/6            4s 755ms/step - kl:
0.6758 - nll: -1.3790 - total_loss: -1.3518 - val_direction: 0.0029 - val_kl:
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0.6759 - val_loss: -1.1567 - val_nll: -1.1851
Epoch 284/2000
6/6            5s 763ms/step - kl:
0.6751 - nll: -1.3798 - total_loss: -1.3526 - val_direction: 0.0027 - val_kl:
0.6753 - val_loss: -1.1619 - val_nll: -1.1903
Epoch 285/2000
6/6            4s 693ms/step - kl:
0.6745 - nll: -1.3787 - total_loss: -1.3515 - val_direction: 0.0030 - val_kl:
0.6747 - val_loss: -1.1535 - val_nll: -1.1820
Epoch 286/2000
6/6            4s 651ms/step - kl:
0.6738 - nll: -1.3761 - total_loss: -1.3488 - val_direction: 0.0031 - val_kl:
0.6740 - val_loss: -1.1390 - val_nll: -1.1676
Epoch 287/2000
6/6            4s 648ms/step - kl:
0.6732 - nll: -1.3784 - total_loss: -1.3513 - val_direction: 0.0028 - val_kl:
0.6733 - val_loss: -1.1637 - val_nll: -1.1921
Epoch 288/2000
6/6            4s 641ms/step - kl:
0.6725 - nll: -1.3769 - total_loss: -1.3497 - val_direction: 0.0030 - val_kl:
0.6726 - val_loss: -1.1526 - val_nll: -1.1810
Epoch 289/2000
6/6            4s 682ms/step - kl:
0.6715 - nll: -1.3773 - total_loss: -1.3502 - val_direction: 0.0027 - val_kl:
0.6712 - val_loss: -1.1702 - val_nll: -1.1984
Epoch 290/2000
6/6            4s 694ms/step - kl:
0.6703 - nll: -1.3807 - total_loss: -1.3536 - val_direction: 0.0027 - val_kl:
0.6706 - val_loss: -1.1634 - val_nll: -1.1915
Epoch 291/2000
6/6            4s 638ms/step - kl:
0.6700 - nll: -1.3770 - total_loss: -1.3500 - val_direction: 0.0030 - val_kl:
0.6699 - val_loss: -1.1537 - val_nll: -1.1820
Epoch 292/2000
6/6            4s 652ms/step - kl:
0.6690 - nll: -1.3795 - total_loss: -1.3525 - val_direction: 0.0025 - val_kl:
0.6695 - val_loss: -1.1774 - val_nll: -1.2055
Epoch 293/2000
6/6            4s 740ms/step - kl:
0.6690 - nll: -1.3790 - total_loss: -1.3520 - val_direction: 0.0029 - val_kl:
0.6693 - val_loss: -1.1557 - val_nll: -1.1840
Epoch 294/2000
6/6            5s 766ms/step - kl:
0.6684 - nll: -1.3736 - total_loss: -1.3465 - val_direction: 0.0031 - val_kl:
0.6684 - val_loss: -1.1460 - val_nll: -1.1743
Epoch 295/2000
6/6            4s 696ms/step - kl:
0.6676 - nll: -1.3788 - total_loss: -1.3518 - val_direction: 0.0025 - val_kl:
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0.6681 - val_loss: -1.1822 - val_nll: -1.2101
Epoch 296/2000
6/6            4s 708ms/step - kl:
0.6679 - nll: -1.3814 - total_loss: -1.3545 - val_direction: 0.0023 - val_kl:
0.6686 - val_loss: -1.1903 - val_nll: -1.2182
Epoch 297/2000
6/6            4s 641ms/step - kl:
0.6679 - nll: -1.3799 - total_loss: -1.3530 - val_direction: 0.0032 - val_kl:
0.6680 - val_loss: -1.1374 - val_nll: -1.1657
Epoch 298/2000
6/6            4s 728ms/step - kl:
0.6668 - nll: -1.3779 - total_loss: -1.3510 - val_direction: 0.0026 - val_kl:
0.6669 - val_loss: -1.1731 - val_nll: -1.2011
Epoch 299/2000
6/6            4s 721ms/step - kl:
0.6665 - nll: -1.3780 - total_loss: -1.3511 - val_direction: 0.0029 - val_kl:
0.6671 - val_loss: -1.1566 - val_nll: -1.1847
Epoch 300/2000
6/6            4s 675ms/step - kl:
0.6660 - nll: -1.3796 - total_loss: -1.3528 - val_direction: 0.0028 - val_kl:
0.6655 - val_loss: -1.1664 - val_nll: -1.1944
Epoch 301/2000
6/6            4s 642ms/step - kl:
0.6647 - nll: -1.3779 - total_loss: -1.3511 - val_direction: 0.0030 - val_kl:
0.6652 - val_loss: -1.1462 - val_nll: -1.1743
Epoch 302/2000
6/6            4s 636ms/step - kl:
0.6644 - nll: -1.3804 - total_loss: -1.3536 - val_direction: 0.0027 - val_kl:
0.6644 - val_loss: -1.1692 - val_nll: -1.1972
Epoch 303/2000
6/6            4s 646ms/step - kl:
0.6634 - nll: -1.3789 - total_loss: -1.3522 - val_direction: 0.0028 - val_kl:
0.6631 - val_loss: -1.1598 - val_nll: -1.1878
Epoch 304/2000
6/6            4s 636ms/step - kl:
0.6620 - nll: -1.3772 - total_loss: -1.3504 - val_direction: 0.0027 - val_kl:
0.6619 - val_loss: -1.1674 - val_nll: -1.1953
Epoch 305/2000
6/6            5s 842ms/step - kl:
0.6611 - nll: -1.3786 - total_loss: -1.3520 - val_direction: 0.0028 - val_kl:
0.6614 - val_loss: -1.1633 - val_nll: -1.1912
Epoch 306/2000
6/6            5s 752ms/step - kl:
0.6607 - nll: -1.3781 - total_loss: -1.3514 - val_direction: 0.0029 - val_kl:
0.6608 - val_loss: -1.1535 - val_nll: -1.1814
Epoch 307/2000
6/6            4s 736ms/step - kl:
0.6599 - nll: -1.3763 - total_loss: -1.3496 - val_direction: 0.0028 - val_kl:
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0.6601 - val_loss: -1.1653 - val_nll: -1.1931
Epoch 308/2000
6/6            4s 646ms/step - kl:
0.6594 - nll: -1.3797 - total_loss: -1.3531 - val_direction: 0.0028 - val_kl:
0.6598 - val_loss: -1.1636 - val_nll: -1.1914
Epoch 309/2000
6/6            4s 643ms/step - kl:
0.6590 - nll: -1.3780 - total_loss: -1.3515 - val_direction: 0.0030 - val_kl:
0.6591 - val_loss: -1.1503 - val_nll: -1.1782
Epoch 310/2000
6/6            4s 646ms/step - kl:
0.6584 - nll: -1.3786 - total_loss: -1.3520 - val_direction: 0.0027 - val_kl:
0.6590 - val_loss: -1.1711 - val_nll: -1.1988
Epoch 311/2000
6/6            4s 631ms/step - kl:
0.6585 - nll: -1.3811 - total_loss: -1.3545 - val_direction: 0.0029 - val_kl:
0.6595 - val_loss: -1.1579 - val_nll: -1.1857
Epoch 312/2000
6/6            4s 632ms/step - kl:
0.6589 - nll: -1.3750 - total_loss: -1.3483 - val_direction: 0.0030 - val_kl:
0.6590 - val_loss: -1.1505 - val_nll: -1.1784
Epoch 313/2000
6/6            4s 632ms/step - kl:
0.6581 - nll: -1.3771 - total_loss: -1.3505 - val_direction: 0.0025 - val_kl:
0.6581 - val_loss: -1.1800 - val_nll: -1.2076
Epoch 314/2000
6/6            4s 644ms/step - kl:
0.6576 - nll: -1.3805 - total_loss: -1.3539 - val_direction: 0.0024 - val_kl:
0.6582 - val_loss: -1.1852 - val_nll: -1.2128
Epoch 315/2000
6/6            5s 812ms/step - kl:
0.6574 - nll: -1.3781 - total_loss: -1.3515 - val_direction: 0.0032 - val_kl:
0.6573 - val_loss: -1.1412 - val_nll: -1.1690
Epoch 316/2000
6/6            5s 810ms/step - kl:
0.6563 - nll: -1.3770 - total_loss: -1.3505 - val_direction: 0.0029 - val_kl:
0.6567 - val_loss: -1.1583 - val_nll: -1.1860
Epoch 317/2000
6/6            4s 654ms/step - kl:
0.6560 - nll: -1.3764 - total_loss: -1.3498 - val_direction: 0.0028 - val_kl:
0.6562 - val_loss: -1.1600 - val_nll: -1.1877
Epoch 318/2000
6/6            4s 714ms/step - kl:
0.6553 - nll: -1.3784 - total_loss: -1.3519 - val_direction: 0.0028 - val_kl:
0.6557 - val_loss: -1.1590 - val_nll: -1.1866
Epoch 319/2000
6/6            4s 641ms/step - kl:
0.6549 - nll: -1.3795 - total_loss: -1.3530 - val_direction: 0.0028 - val_kl:
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0.6550 - val_loss: -1.1635 - val_nll: -1.1911
Epoch 320/2000
6/6            4s 645ms/step - kl:
0.6542 - nll: -1.3775 - total_loss: -1.3511 - val_direction: 0.0028 - val_kl:
0.6546 - val_loss: -1.1636 - val_nll: -1.1912
Epoch 321/2000
6/6            4s 637ms/step - kl:
0.6540 - nll: -1.3782 - total_loss: -1.3518 - val_direction: 0.0027 - val_kl:
0.6549 - val_loss: -1.1672 - val_nll: -1.1947
Epoch 322/2000
6/6            4s 647ms/step - kl:
0.6546 - nll: -1.3797 - total_loss: -1.3533 - val_direction: 0.0027 - val_kl:
0.6553 - val_loss: -1.1652 - val_nll: -1.1928
Epoch 323/2000
6/6            4s 634ms/step - kl:
0.6545 - nll: -1.3800 - total_loss: -1.3536 - val_direction: 0.0029 - val_kl:
0.6548 - val_loss: -1.1568 - val_nll: -1.1844
Epoch 324/2000
6/6            4s 632ms/step - kl:
0.6543 - nll: -1.3774 - total_loss: -1.3510 - val_direction: 0.0030 - val_kl:
0.6547 - val_loss: -1.1455 - val_nll: -1.1732
Epoch 325/2000
6/6            5s 802ms/step - kl:
0.6536 - nll: -1.3765 - total_loss: -1.3500 - val_direction: 0.0029 - val_kl:
0.6536 - val_loss: -1.1560 - val_nll: -1.1836
Epoch 326/2000
6/6            5s 808ms/step - kl:
0.6530 - nll: -1.3799 - total_loss: -1.3536 - val_direction: 0.0023 - val_kl:
0.6536 - val_loss: -1.1907 - val_nll: -1.2180
Epoch 327/2000
6/6            4s 649ms/step - kl:
0.6529 - nll: -1.3806 - total_loss: -1.3543 - val_direction: 0.0030 - val_kl:
0.6528 - val_loss: -1.1509 - val_nll: -1.1785
Epoch 328/2000
6/6            4s 721ms/step - kl:
0.6518 - nll: -1.3772 - total_loss: -1.3509 - val_direction: 0.0029 - val_kl:
0.6518 - val_loss: -1.1563 - val_nll: -1.1838
Epoch 329/2000
6/6            4s 692ms/step - kl:
0.6511 - nll: -1.3776 - total_loss: -1.3513 - val_direction: 0.0025 - val_kl:
0.6516 - val_loss: -1.1770 - val_nll: -1.2044
Epoch 330/2000
6/6            4s 641ms/step - kl:
0.6509 - nll: -1.3793 - total_loss: -1.3531 - val_direction: 0.0030 - val_kl:
0.6510 - val_loss: -1.1502 - val_nll: -1.1777
Epoch 331/2000
6/6            4s 630ms/step - kl:
0.6499 - nll: -1.3797 - total_loss: -1.3535 - val_direction: 0.0028 - val_kl:
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0.6502 - val_loss: -1.1646 - val_nll: -1.1920
Epoch 332/2000
6/6             4s 632ms/step - kl:
0.6495 - nll: -1.3782 - total_loss: -1.3520 - val_direction: 0.0029 - val_kl:
0.6499 - val_loss: -1.1538 - val_nll: -1.1812
Epoch 333/2000
6/6             4s 633ms/step - kl:
0.6488 - nll: -1.3792 - total_loss: -1.3531 - val_direction: 0.0028 - val_kl:
0.6485 - val_loss: -1.1630 - val_nll: -1.1904
Epoch 334/2000
6/6             4s 634ms/step - kl:
0.6475 - nll: -1.3814 - total_loss: -1.3554 - val_direction: 0.0027 - val_kl:
0.6477 - val_loss: -1.1723 - val_nll: -1.1996
Epoch 335/2000
6/6             5s 793ms/step - kl:
0.6469 - nll: -1.3788 - total_loss: -1.3527 - val_direction: 0.0032 - val_kl:
0.6467 - val_loss: -1.1324 - val_nll: -1.1599
Epoch 336/2000
6/6             5s 785ms/step - kl:
0.6455 - nll: -1.3767 - total_loss: -1.3506 - val_direction: 0.0029 - val_kl:
0.6457 - val_loss: -1.1591 - val_nll: -1.1863
Epoch 337/2000
6/6             4s 712ms/step - kl:
0.6453 - nll: -1.3796 - total_loss: -1.3536 - val_direction: 0.0026 - val_kl:
0.6458 - val_loss: -1.1742 - val_nll: -1.2013
Epoch 338/2000
6/6             4s 643ms/step - kl:
0.6447 - nll: -1.3792 - total_loss: -1.3531 - val_direction: 0.0031 - val_kl:
0.6448 - val_loss: -1.1479 - val_nll: -1.1752
Epoch 339/2000
6/6             4s 640ms/step - kl:
0.6441 - nll: -1.3767 - total_loss: -1.3506 - val_direction: 0.0028 - val_kl:
0.6446 - val_loss: -1.1606 - val_nll: -1.1878
Epoch 340/2000
6/6             4s 684ms/step - kl:
0.6438 - nll: -1.3803 - total_loss: -1.3543 - val_direction: 0.0024 - val_kl:
0.6442 - val_loss: -1.1870 - val_nll: -1.2140
Epoch 341/2000
6/6             4s 633ms/step - kl:
0.6439 - nll: -1.3810 - total_loss: -1.3550 - val_direction: 0.0030 - val_kl:
0.6450 - val_loss: -1.1512 - val_nll: -1.1785
Epoch 342/2000
6/6             4s 676ms/step - kl:
0.6442 - nll: -1.3767 - total_loss: -1.3507 - val_direction: 0.0030 - val_kl:
0.6439 - val_loss: -1.1505 - val_nll: -1.1777
Epoch 343/2000
6/6             4s 630ms/step - kl:
0.6428 - nll: -1.3799 - total_loss: -1.3540 - val_direction: 0.0024 - val_kl:
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0.6431 - val_loss: -1.1830 - val_nll: -1.2100
Epoch 344/2000
6/6            4s 658ms/step - kl:
0.6425 - nll: -1.3801 - total_loss: -1.3541 - val_direction: 0.0027 - val_kl:
0.6431 - val_loss: -1.1684 - val_nll: -1.1954
Epoch 345/2000
6/6            5s 820ms/step - kl:
0.6421 - nll: -1.3800 - total_loss: -1.3541 - val_direction: 0.0029 - val_kl:
0.6422 - val_loss: -1.1555 - val_nll: -1.1826
Epoch 346/2000
6/6            5s 751ms/step - kl:
0.6414 - nll: -1.3785 - total_loss: -1.3526 - val_direction: 0.0030 - val_kl:
0.6418 - val_loss: -1.1466 - val_nll: -1.1737
Epoch 347/2000
6/6            4s 718ms/step - kl:
0.6412 - nll: -1.3774 - total_loss: -1.3515 - val_direction: 0.0028 - val_kl:
0.6419 - val_loss: -1.1605 - val_nll: -1.1875
Epoch 348/2000
6/6            4s 642ms/step - kl:
0.6411 - nll: -1.3785 - total_loss: -1.3526 - val_direction: 0.0027 - val_kl:
0.6412 - val_loss: -1.1677 - val_nll: -1.1947
Epoch 349/2000
6/6            4s 641ms/step - kl:
0.6403 - nll: -1.3792 - total_loss: -1.3534 - val_direction: 0.0031 - val_kl:
0.6407 - val_loss: -1.1485 - val_nll: -1.1756
Epoch 350/2000
6/6            4s 643ms/step - kl:
0.6402 - nll: -1.3754 - total_loss: -1.3495 - val_direction: 0.0029 - val_kl:
0.6406 - val_loss: -1.1570 - val_nll: -1.1841
Epoch 351/2000
6/6            4s 653ms/step - kl:
0.6397 - nll: -1.3792 - total_loss: -1.3534 - val_direction: 0.0025 - val_kl:
0.6400 - val_loss: -1.1789 - val_nll: -1.2057
Epoch 352/2000
6/6            4s 648ms/step - kl:
0.6394 - nll: -1.3798 - total_loss: -1.3540 - val_direction: 0.0028 - val_kl:
0.6399 - val_loss: -1.1617 - val_nll: -1.1887
Epoch 353/2000
6/6            4s 635ms/step - kl:
0.6390 - nll: -1.3772 - total_loss: -1.3514 - val_direction: 0.0034 - val_kl:
0.6393 - val_loss: -1.1311 - val_nll: -1.1583
Epoch 354/2000
6/6            4s 639ms/step - kl:
0.6385 - nll: -1.3743 - total_loss: -1.3485 - val_direction: 0.0027 - val_kl:
0.6387 - val_loss: -1.1726 - val_nll: -1.1995
Epoch 355/2000
6/6            5s 838ms/step - kl:
0.6380 - nll: -1.3804 - total_loss: -1.3546 - val_direction: 0.0028 - val_kl:
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0.6383 - val_loss: -1.1624 - val_nll: -1.1893
Epoch 356/2000
6/6            5s 752ms/step - kl:
0.6374 - nll: -1.3790 - total_loss: -1.3532 - val_direction: 0.0029 - val_kl:
0.6377 - val_loss: -1.1608 - val_nll: -1.1878
Epoch 357/2000
6/6            4s 713ms/step - kl:
0.6370 - nll: -1.3752 - total_loss: -1.3495 - val_direction: 0.0030 - val_kl:
0.6376 - val_loss: -1.1485 - val_nll: -1.1755
Epoch 358/2000
6/6            4s 655ms/step - kl:
0.6368 - nll: -1.3779 - total_loss: -1.3522 - val_direction: 0.0028 - val_kl:
0.6372 - val_loss: -1.1620 - val_nll: -1.1889
Epoch 359/2000
6/6            4s 656ms/step - kl:
0.6367 - nll: -1.3780 - total_loss: -1.3523 - val_direction: 0.0030 - val_kl:
0.6376 - val_loss: -1.1510 - val_nll: -1.1780
Epoch 360/2000
6/6            4s 700ms/step - kl:
0.6368 - nll: -1.3793 - total_loss: -1.3536 - val_direction: 0.0026 - val_kl:
0.6372 - val_loss: -1.1797 - val_nll: -1.2065
Epoch 361/2000
6/6            4s 662ms/step - kl:
0.6366 - nll: -1.3798 - total_loss: -1.3541 - val_direction: 0.0026 - val_kl:
0.6371 - val_loss: -1.1745 - val_nll: -1.2012
Epoch 362/2000
6/6            4s 639ms/step - kl:
0.6361 - nll: -1.3794 - total_loss: -1.3538 - val_direction: 0.0031 - val_kl:
0.6362 - val_loss: -1.1462 - val_nll: -1.1732
Epoch 363/2000
6/6            4s 638ms/step - kl:
0.6353 - nll: -1.3764 - total_loss: -1.3507 - val_direction: 0.0030 - val_kl:
0.6356 - val_loss: -1.1522 - val_nll: -1.1791
Epoch 364/2000
6/6            4s 774ms/step - kl:
0.6350 - nll: -1.3762 - total_loss: -1.3506 - val_direction: 0.0029 - val_kl:
0.6354 - val_loss: -1.1543 - val_nll: -1.1812
Epoch 365/2000
6/6            5s 816ms/step - kl:
0.6344 - nll: -1.3776 - total_loss: -1.3520 - val_direction: 0.0028 - val_kl:
0.6344 - val_loss: -1.1667 - val_nll: -1.1935
Epoch 366/2000
6/6            4s 684ms/step - kl:
0.6337 - nll: -1.3789 - total_loss: -1.3533 - val_direction: 0.0027 - val_kl:
0.6344 - val_loss: -1.1676 - val_nll: -1.1943
Epoch 367/2000
6/6            4s 664ms/step - kl:
0.6337 - nll: -1.3789 - total_loss: -1.3533 - val_direction: 0.0027 - val_kl:
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0.6342 - val_loss: -1.1655 - val_nll: -1.1923
Epoch 368/2000
6/6            4s 639ms/step - kl:
0.6334 - nll: -1.3766 - total_loss: -1.3510 - val_direction: 0.0031 - val_kl:
0.6338 - val_loss: -1.1443 - val_nll: -1.1712
Epoch 369/2000
6/6            4s 643ms/step - kl:
0.6331 - nll: -1.3782 - total_loss: -1.3526 - val_direction: 0.0026 - val_kl:
0.6338 - val_loss: -1.1765 - val_nll: -1.2032
Epoch 370/2000
6/6            4s 716ms/step - kl:
0.6333 - nll: -1.3794 - total_loss: -1.3539 - val_direction: 0.0026 - val_kl:
0.6338 - val_loss: -1.1726 - val_nll: -1.1993
Epoch 371/2000
6/6            4s 708ms/step - kl:
0.6330 - nll: -1.3796 - total_loss: -1.3540 - val_direction: 0.0029 - val_kl:
0.6333 - val_loss: -1.1567 - val_nll: -1.1835
Epoch 372/2000
6/6            4s 632ms/step - kl:
0.6325 - nll: -1.3772 - total_loss: -1.3516 - val_direction: 0.0030 - val_kl:
0.6325 - val_loss: -1.1537 - val_nll: -1.1805
Epoch 373/2000
6/6            4s 644ms/step - kl:
0.6315 - nll: -1.3793 - total_loss: -1.3538 - val_direction: 0.0029 - val_kl:
0.6317 - val_loss: -1.1613 - val_nll: -1.1880
Epoch 374/2000
6/6            4s 727ms/step - kl:
0.6309 - nll: -1.3763 - total_loss: -1.3508 - val_direction: 0.0033 - val_kl:
0.6312 - val_loss: -1.1309 - val_nll: -1.1578
Epoch 375/2000
6/6            5s 798ms/step - kl:
0.6300 - nll: -1.3778 - total_loss: -1.3523 - val_direction: 0.0025 - val_kl:
0.6301 - val_loss: -1.1817 - val_nll: -1.2081
Epoch 376/2000
6/6            4s 729ms/step - kl:
0.6296 - nll: -1.3799 - total_loss: -1.3545 - val_direction: 0.0026 - val_kl:
0.6301 - val_loss: -1.1747 - val_nll: -1.2012
Epoch 377/2000
6/6            4s 716ms/step - kl:
0.6294 - nll: -1.3781 - total_loss: -1.3527 - val_direction: 0.0030 - val_kl:
0.6298 - val_loss: -1.1489 - val_nll: -1.1756
Epoch 378/2000
6/6            4s 641ms/step - kl:
0.6292 - nll: -1.3760 - total_loss: -1.3505 - val_direction: 0.0031 - val_kl:
0.6300 - val_loss: -1.1481 - val_nll: -1.1748
Epoch 379/2000
6/6            4s 646ms/step - kl:
0.6293 - nll: -1.3792 - total_loss: -1.3537 - val_direction: 0.0026 - val_kl:
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0.6298 - val_loss: -1.1751 - val_nll: -1.2016
Epoch 380/2000
6/6             4s 644ms/step - kl:
0.6294 - nll: -1.3774 - total_loss: -1.3520 - val_direction: 0.0030 - val_kl:
0.6299 - val_loss: -1.1529 - val_nll: -1.1796
Epoch 381/2000
6/6             4s 644ms/step - kl:
0.6289 - nll: -1.3798 - total_loss: -1.3544 - val_direction: 0.0027 - val_kl:
0.6293 - val_loss: -1.1689 - val_nll: -1.1954
Epoch 382/2000
6/6             4s 636ms/step - kl:
0.6286 - nll: -1.3807 - total_loss: -1.3554 - val_direction: 0.0027 - val_kl:
0.6289 - val_loss: -1.1709 - val_nll: -1.1974
Epoch 383/2000
6/6             4s 641ms/step - kl:
0.6278 - nll: -1.3791 - total_loss: -1.3538 - val_direction: 0.0031 - val_kl:
0.6278 - val_loss: -1.1483 - val_nll: -1.1750
Epoch 384/2000
6/6             4s 642ms/step - kl:
0.6269 - nll: -1.3771 - total_loss: -1.3517 - val_direction: 0.0030 - val_kl:
0.6273 - val_loss: -1.1509 - val_nll: -1.1775
Epoch 385/2000
6/6             5s 807ms/step - kl:
0.6263 - nll: -1.3749 - total_loss: -1.3496 - val_direction: 0.0028 - val_kl:
0.6261 - val_loss: -1.1658 - val_nll: -1.1923
Epoch 386/2000
6/6             5s 790ms/step - kl:
0.6251 - nll: -1.3820 - total_loss: -1.3568 - val_direction: 0.0023 - val_kl:
0.6256 - val_loss: -1.1892 - val_nll: -1.2154
Epoch 387/2000
6/6             4s 700ms/step - kl:
0.6255 - nll: -1.3777 - total_loss: -1.3524 - val_direction: 0.0032 - val_kl:
0.6265 - val_loss: -1.1360 - val_nll: -1.1626
Epoch 388/2000
6/6             4s 672ms/step - kl:
0.6252 - nll: -1.3773 - total_loss: -1.3521 - val_direction: 0.0030 - val_kl:
0.6249 - val_loss: -1.1559 - val_nll: -1.1824
Epoch 389/2000
6/6             4s 648ms/step - kl:
0.6245 - nll: -1.3794 - total_loss: -1.3542 - val_direction: 0.0026 - val_kl:
0.6256 - val_loss: -1.1724 - val_nll: -1.1987
Epoch 390/2000
6/6             4s 644ms/step - kl:
0.6249 - nll: -1.3765 - total_loss: -1.3512 - val_direction: 0.0030 - val_kl:
0.6251 - val_loss: -1.1499 - val_nll: -1.1764
Epoch 391/2000
6/6             4s 706ms/step - kl:
0.6242 - nll: -1.3773 - total_loss: -1.3521 - val_direction: 0.0027 - val_kl:
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0.6246 - val_loss: -1.1712 - val_nll: -1.1976
Epoch 392/2000
6/6            4s 703ms/step - kl:
0.6243 - nll: -1.3774 - total_loss: -1.3522 - val_direction: 0.0027 - val_kl:
0.6249 - val_loss: -1.1647 - val_nll: -1.1911
Epoch 393/2000
6/6            4s 706ms/step - kl:
0.6238 - nll: -1.3802 - total_loss: -1.3550 - val_direction: 0.0026 - val_kl:
0.6241 - val_loss: -1.1743 - val_nll: -1.2005
Epoch 394/2000
6/6            4s 699ms/step - kl:
0.6235 - nll: -1.3796 - total_loss: -1.3545 - val_direction: 0.0029 - val_kl:
0.6242 - val_loss: -1.1556 - val_nll: -1.1820
Epoch 395/2000
6/6            4s 709ms/step - kl:
0.6234 - nll: -1.3779 - total_loss: -1.3527 - val_direction: 0.0030 - val_kl:
0.6236 - val_loss: -1.1482 - val_nll: -1.1747
Epoch 396/2000
6/6            4s 666ms/step - kl:
0.6226 - nll: -1.3792 - total_loss: -1.3541 - val_direction: 0.0028 - val_kl:
0.6227 - val_loss: -1.1669 - val_nll: -1.1932
Epoch 397/2000
6/6            4s 635ms/step - kl:
0.6217 - nll: -1.3790 - total_loss: -1.3539 - val_direction: 0.0029 - val_kl:
0.6216 - val_loss: -1.1549 - val_nll: -1.1813
Epoch 398/2000
6/6            4s 632ms/step - kl:
0.6205 - nll: -1.3761 - total_loss: -1.3510 - val_direction: 0.0030 - val_kl:
0.6207 - val_loss: -1.1465 - val_nll: -1.1729
Epoch 399/2000
6/6            5s 785ms/step - kl:
0.6200 - nll: -1.3746 - total_loss: -1.3496 - val_direction: 0.0030 - val_kl:
0.6200 - val_loss: -1.1529 - val_nll: -1.1792
Epoch 400/2000
6/6            5s 783ms/step - kl:
0.6188 - nll: -1.3807 - total_loss: -1.3557 - val_direction: 0.0025 - val_kl:
0.6190 - val_loss: -1.1840 - val_nll: -1.2100
Epoch 401/2000
6/6            4s 708ms/step - kl:
0.6186 - nll: -1.3789 - total_loss: -1.3540 - val_direction: 0.0028 - val_kl:
0.6190 - val_loss: -1.1633 - val_nll: -1.1895
Epoch 402/2000
6/6            4s 657ms/step - kl:
0.6178 - nll: -1.3809 - total_loss: -1.3560 - val_direction: 0.0024 - val_kl:
0.6179 - val_loss: -1.1842 - val_nll: -1.2102
Epoch 403/2000
6/6            4s 662ms/step - kl:
0.6175 - nll: -1.3809 - total_loss: -1.3560 - val_direction: 0.0028 - val_kl:
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0.6185 - val_loss: -1.1640 - val_nll: -1.1902
Epoch 404/2000
6/6            4s 644ms/step - kl:
0.6177 - nll: -1.3785 - total_loss: -1.3535 - val_direction: 0.0031 - val_kl:
0.6180 - val_loss: -1.1464 - val_nll: -1.1726
Epoch 405/2000
6/6            4s 714ms/step - kl:
0.6172 - nll: -1.3771 - total_loss: -1.3522 - val_direction: 0.0029 - val_kl:
0.6177 - val_loss: -1.1588 - val_nll: -1.1850
Epoch 406/2000
6/6            4s 703ms/step - kl:
0.6171 - nll: -1.3783 - total_loss: -1.3533 - val_direction: 0.0026 - val_kl:
0.6176 - val_loss: -1.1770 - val_nll: -1.2030
Epoch 407/2000
6/6            4s 634ms/step - kl:
0.6168 - nll: -1.3780 - total_loss: -1.3531 - val_direction: 0.0028 - val_kl:
0.6170 - val_loss: -1.1642 - val_nll: -1.1903
Epoch 408/2000
6/6            4s 633ms/step - kl:
0.6163 - nll: -1.3782 - total_loss: -1.3533 - val_direction: 0.0030 - val_kl:
0.6172 - val_loss: -1.1538 - val_nll: -1.1800
Epoch 409/2000
6/6            4s 662ms/step - kl:
0.6166 - nll: -1.3770 - total_loss: -1.3521 - val_direction: 0.0027 - val_kl:
0.6170 - val_loss: -1.1718 - val_nll: -1.1978
Epoch 410/2000
6/6            5s 827ms/step - kl:
0.6161 - nll: -1.3805 - total_loss: -1.3556 - val_direction: 0.0027 - val_kl:
0.6167 - val_loss: -1.1726 - val_nll: -1.1986
Epoch 411/2000
6/6            4s 714ms/step - kl:
0.6161 - nll: -1.3781 - total_loss: -1.3532 - val_direction: 0.0031 - val_kl:
0.6165 - val_loss: -1.1497 - val_nll: -1.1759
Epoch 412/2000
6/6            4s 675ms/step - kl:
0.6155 - nll: -1.3790 - total_loss: -1.3542 - val_direction: 0.0029 - val_kl:
0.6157 - val_loss: -1.1613 - val_nll: -1.1874
Epoch 413/2000
6/6            4s 653ms/step - kl:
0.6153 - nll: -1.3776 - total_loss: -1.3527 - val_direction: 0.0029 - val_kl:
0.6162 - val_loss: -1.1573 - val_nll: -1.1834
Epoch 414/2000
6/6            4s 642ms/step - kl:
0.6151 - nll: -1.3767 - total_loss: -1.3518 - val_direction: 0.0026 - val_kl:
0.6147 - val_loss: -1.1803 - val_nll: -1.2062
Epoch 415/2000
6/6            4s 642ms/step - kl:
0.6139 - nll: -1.3807 - total_loss: -1.3559 - val_direction: 0.0027 - val_kl:
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0.6150 - val_loss: -1.1669 - val_nll: -1.1928
Epoch 416/2000
6/6            4s 752ms/step - kl:
0.6142 - nll: -1.3782 - total_loss: -1.3534 - val_direction: 0.0029 - val_kl:
0.6142 - val_loss: -1.1553 - val_nll: -1.1813
Epoch 417/2000
6/6            4s 656ms/step - kl:
0.6130 - nll: -1.3789 - total_loss: -1.3541 - val_direction: 0.0027 - val_kl:
0.6132 - val_loss: -1.1696 - val_nll: -1.1954
Epoch 418/2000
6/6            4s 688ms/step - kl:
0.6128 - nll: -1.3783 - total_loss: -1.3535 - val_direction: 0.0026 - val_kl:
0.6134 - val_loss: -1.1738 - val_nll: -1.1997
Epoch 419/2000
6/6            4s 632ms/step - kl:
0.6124 - nll: -1.3769 - total_loss: -1.3522 - val_direction: 0.0033 - val_kl:
0.6124 - val_loss: -1.1410 - val_nll: -1.1671
Epoch 420/2000
6/6            4s 636ms/step - kl:
0.6117 - nll: -1.3780 - total_loss: -1.3533 - val_direction: 0.0026 - val_kl:
0.6125 - val_loss: -1.1753 - val_nll: -1.2011
Epoch 421/2000
6/6            5s 806ms/step - kl:
0.6121 - nll: -1.3794 - total_loss: -1.3547 - val_direction: 0.0028 - val_kl:
0.6127 - val_loss: -1.1663 - val_nll: -1.1922
Epoch 422/2000
6/6            4s 731ms/step - kl:
0.6118 - nll: -1.3781 - total_loss: -1.3533 - val_direction: 0.0032 - val_kl:
0.6123 - val_loss: -1.1385 - val_nll: -1.1646
Epoch 423/2000
6/6            4s 715ms/step - kl:
0.6117 - nll: -1.3774 - total_loss: -1.3526 - val_direction: 0.0027 - val_kl:
0.6121 - val_loss: -1.1695 - val_nll: -1.1953
Epoch 424/2000
6/6            4s 643ms/step - kl:
0.6114 - nll: -1.3789 - total_loss: -1.3542 - val_direction: 0.0025 - val_kl:
0.6115 - val_loss: -1.1839 - val_nll: -1.2096
Epoch 425/2000
6/6            4s 663ms/step - kl:
0.6105 - nll: -1.3803 - total_loss: -1.3557 - val_direction: 0.0028 - val_kl:
0.6109 - val_loss: -1.1636 - val_nll: -1.1894
Epoch 426/2000
6/6            4s 646ms/step - kl:
0.6103 - nll: -1.3781 - total_loss: -1.3535 - val_direction: 0.0026 - val_kl:
0.6110 - val_loss: -1.1728 - val_nll: -1.1986
Epoch 427/2000
6/6            4s 706ms/step - kl:
0.6104 - nll: -1.3783 - total_loss: -1.3537 - val_direction: 0.0027 - val_kl:
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0.6111 - val_loss: -1.1693 - val_nll: -1.1951
Epoch 428/2000
6/6            4s 665ms/step - kl:
0.6101 - nll: -1.3775 - total_loss: -1.3529 - val_direction: 0.0029 - val_kl:
0.6104 - val_loss: -1.1609 - val_nll: -1.1868
Epoch 429/2000
6/6            4s 635ms/step - kl:
0.6095 - nll: -1.3783 - total_loss: -1.3537 - val_direction: 0.0028 - val_kl:
0.6100 - val_loss: -1.1646 - val_nll: -1.1904
Epoch 430/2000
6/6            4s 631ms/step - kl:
0.6093 - nll: -1.3756 - total_loss: -1.3510 - val_direction: 0.0032 - val_kl:
0.6096 - val_loss: -1.1410 - val_nll: -1.1670
Epoch 431/2000
6/6            4s 643ms/step - kl:
0.6087 - nll: -1.3782 - total_loss: -1.3536 - val_direction: 0.0027 - val_kl:
0.6090 - val_loss: -1.1699 - val_nll: -1.1956
Epoch 432/2000
6/6            5s 750ms/step - kl:
0.6084 - nll: -1.3795 - total_loss: -1.3550 - val_direction: 0.0028 - val_kl:
0.6090 - val_loss: -1.1617 - val_nll: -1.1875
Epoch 433/2000
6/6            4s 722ms/step - kl:
0.6084 - nll: -1.3779 - total_loss: -1.3534 - val_direction: 0.0030 - val_kl:
0.6086 - val_loss: -1.1526 - val_nll: -1.1784
Epoch 434/2000
6/6            4s 708ms/step - kl:
0.6077 - nll: -1.3790 - total_loss: -1.3544 - val_direction: 0.0028 - val_kl:
0.6085 - val_loss: -1.1641 - val_nll: -1.1899
Epoch 435/2000
6/6            4s 646ms/step - kl:
0.6080 - nll: -1.3791 - total_loss: -1.3546 - val_direction: 0.0027 - val_kl:
0.6085 - val_loss: -1.1697 - val_nll: -1.1953
Epoch 436/2000
6/6            4s 643ms/step - kl:
0.6074 - nll: -1.3789 - total_loss: -1.3544 - val_direction: 0.0028 - val_kl:
0.6075 - val_loss: -1.1633 - val_nll: -1.1890
Epoch 437/2000
6/6            4s 640ms/step - kl:
0.6069 - nll: -1.3785 - total_loss: -1.3540 - val_direction: 0.0029 - val_kl:
0.6079 - val_loss: -1.1575 - val_nll: -1.1833
Epoch 438/2000
6/6            4s 720ms/step - kl:
0.6073 - nll: -1.3779 - total_loss: -1.3533 - val_direction: 0.0032 - val_kl:
0.6076 - val_loss: -1.1390 - val_nll: -1.1649
Epoch 439/2000
6/6            4s 662ms/step - kl:
0.6065 - nll: -1.3772 - total_loss: -1.3526 - val_direction: 0.0030 - val_kl:
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0.6067 - val_loss: -1.1564 - val_nll: -1.1821
Epoch 440/2000
6/6            4s 649ms/step - kl:
0.6062 - nll: -1.3762 - total_loss: -1.3517 - val_direction: 0.0025 - val_kl:
0.6068 - val_loss: -1.1813 - val_nll: -1.2069
Epoch 441/2000
6/6            4s 635ms/step - kl:
0.6059 - nll: -1.3795 - total_loss: -1.3550 - val_direction: 0.0028 - val_kl:
0.6062 - val_loss: -1.1626 - val_nll: -1.1882
Epoch 442/2000
6/6            4s 682ms/step - kl:
0.6056 - nll: -1.3788 - total_loss: -1.3543 - val_direction: 0.0028 - val_kl:
0.6063 - val_loss: -1.1620 - val_nll: -1.1876
Epoch 443/2000
6/6            5s 788ms/step - kl:
0.6057 - nll: -1.3776 - total_loss: -1.3532 - val_direction: 0.0029 - val_kl:
0.6061 - val_loss: -1.1585 - val_nll: -1.1842
Epoch 444/2000
6/6            5s 747ms/step - kl:
0.6053 - nll: -1.3775 - total_loss: -1.3531 - val_direction: 0.0025 - val_kl:
0.6057 - val_loss: -1.1858 - val_nll: -1.2113
Epoch 445/2000
6/6            4s 696ms/step - kl:
0.6055 - nll: -1.3823 - total_loss: -1.3578 - val_direction: 0.0025 - val_kl:
0.6068 - val_loss: -1.1797 - val_nll: -1.2053
Epoch 446/2000
6/6            4s 644ms/step - kl:
0.6064 - nll: -1.3810 - total_loss: -1.3566 - val_direction: 0.0034 - val_kl:
0.6072 - val_loss: -1.1288 - val_nll: -1.1548
Epoch 447/2000
6/6            4s 667ms/step - kl:
0.6062 - nll: -1.3741 - total_loss: -1.3495 - val_direction: 0.0030 - val_kl:
0.6065 - val_loss: -1.1555 - val_nll: -1.1812
Epoch 448/2000
6/6            4s 672ms/step - kl:
0.6059 - nll: -1.3790 - total_loss: -1.3545 - val_direction: 0.0025 - val_kl:
0.6068 - val_loss: -1.1789 - val_nll: -1.2044
Epoch 449/2000
6/6            4s 633ms/step - kl:
0.6061 - nll: -1.3809 - total_loss: -1.3565 - val_direction: 0.0028 - val_kl:
0.6062 - val_loss: -1.1646 - val_nll: -1.1903
Epoch 450/2000
6/6            4s 672ms/step - kl:
0.6049 - nll: -1.3792 - total_loss: -1.3547 - val_direction: 0.0030 - val_kl:
0.6050 - val_loss: -1.1531 - val_nll: -1.1788
Epoch 451/2000
6/6            4s 633ms/step - kl:
0.6043 - nll: -1.3769 - total_loss: -1.3524 - val_direction: 0.0028 - val_kl:
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0.6043 - val_loss: -1.1611 - val_nll: -1.1867
Epoch 452/2000
6/6            4s 634ms/step - kl:
0.6030 - nll: -1.3800 - total_loss: -1.3557 - val_direction: 0.0027 - val_kl:
0.6028 - val_loss: -1.1656 - val_nll: -1.1911
Epoch 453/2000
6/6            5s 799ms/step - kl:
0.6021 - nll: -1.3776 - total_loss: -1.3533 - val_direction: 0.0030 - val_kl:
0.6024 - val_loss: -1.1506 - val_nll: -1.1762
Epoch 454/2000
6/6            4s 734ms/step - kl:
0.6013 - nll: -1.3796 - total_loss: -1.3553 - val_direction: 0.0029 - val_kl:
0.6015 - val_loss: -1.1591 - val_nll: -1.1846
Epoch 455/2000
6/6            4s 718ms/step - kl:
0.6009 - nll: -1.3775 - total_loss: -1.3533 - val_direction: 0.0029 - val_kl:
0.6016 - val_loss: -1.1612 - val_nll: -1.1867
Epoch 456/2000
6/6            4s 641ms/step - kl:
0.6007 - nll: -1.3803 - total_loss: -1.3561 - val_direction: 0.0027 - val_kl:
0.6007 - val_loss: -1.1733 - val_nll: -1.1986
Epoch 457/2000
6/6            4s 647ms/step - kl:
0.5999 - nll: -1.3794 - total_loss: -1.3551 - val_direction: 0.0030 - val_kl:
0.6003 - val_loss: -1.1535 - val_nll: -1.1790
Epoch 458/2000
6/6            4s 649ms/step - kl:
0.5997 - nll: -1.3781 - total_loss: -1.3539 - val_direction: 0.0030 - val_kl:
0.6002 - val_loss: -1.1578 - val_nll: -1.1833
Epoch 459/2000
6/6            4s 685ms/step - kl:
0.5997 - nll: -1.3782 - total_loss: -1.3540 - val_direction: 0.0029 - val_kl:
0.6005 - val_loss: -1.1576 - val_nll: -1.1831
Epoch 460/2000
6/6            4s 666ms/step - kl:
0.6000 - nll: -1.3781 - total_loss: -1.3538 - val_direction: 0.0028 - val_kl:
0.6008 - val_loss: -1.1644 - val_nll: -1.1899
Epoch 461/2000
6/6            4s 632ms/step - kl:
0.6003 - nll: -1.3794 - total_loss: -1.3552 - val_direction: 0.0028 - val_kl:
0.6012 - val_loss: -1.1653 - val_nll: -1.1907
Epoch 462/2000
6/6            4s 655ms/step - kl:
0.6005 - nll: -1.3785 - total_loss: -1.3543 - val_direction: 0.0032 - val_kl:
0.6012 - val_loss: -1.1424 - val_nll: -1.1680
Epoch 463/2000
6/6            4s 711ms/step - kl:
0.6007 - nll: -1.3783 - total_loss: -1.3540 - val_direction: 0.0028 - val_kl:
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0.6015 - val_loss: -1.1678 - val_nll: -1.1932
Epoch 464/2000
6/6            4s 741ms/step - kl:
0.6008 - nll: -1.3791 - total_loss: -1.3549 - val_direction: 0.0027 - val_kl:
0.6011 - val_loss: -1.1691 - val_nll: -1.1945
Epoch 465/2000
6/6            4s 711ms/step - kl:
0.6004 - nll: -1.3775 - total_loss: -1.3533 - val_direction: 0.0031 - val_kl:
0.6007 - val_loss: -1.1455 - val_nll: -1.1711
Epoch 466/2000
6/6            4s 717ms/step - kl:
0.5998 - nll: -1.3768 - total_loss: -1.3526 - val_direction: 0.0027 - val_kl:
0.6000 - val_loss: -1.1709 - val_nll: -1.1963
Epoch 467/2000
6/6            4s 646ms/step - kl:
0.5990 - nll: -1.3766 - total_loss: -1.3524 - val_direction: 0.0028 - val_kl:
0.5991 - val_loss: -1.1649 - val_nll: -1.1903
Epoch 468/2000
6/6            4s 645ms/step - kl:
0.5985 - nll: -1.3782 - total_loss: -1.3541 - val_direction: 0.0030 - val_kl:
0.5992 - val_loss: -1.1563 - val_nll: -1.1818
Epoch 469/2000
6/6            4s 656ms/step - kl:
0.5982 - nll: -1.3776 - total_loss: -1.3534 - val_direction: 0.0028 - val_kl:
0.5984 - val_loss: -1.1662 - val_nll: -1.1916
Epoch 470/2000
6/6            4s 720ms/step - kl:
0.5978 - nll: -1.3803 - total_loss: -1.3561 - val_direction: 0.0026 - val_kl:
0.5985 - val_loss: -1.1738 - val_nll: -1.1991
Epoch 471/2000
6/6            4s 683ms/step - kl:
0.5975 - nll: -1.3786 - total_loss: -1.3545 - val_direction: 0.0031 - val_kl:
0.5977 - val_loss: -1.1436 - val_nll: -1.1691
Epoch 472/2000
6/6            4s 632ms/step - kl:
0.5969 - nll: -1.3786 - total_loss: -1.3545 - val_direction: 0.0026 - val_kl:
0.5974 - val_loss: -1.1779 - val_nll: -1.2031
Epoch 473/2000
6/6            4s 636ms/step - kl:
0.5969 - nll: -1.3808 - total_loss: -1.3568 - val_direction: 0.0026 - val_kl:
0.5975 - val_loss: -1.1778 - val_nll: -1.2030
Epoch 474/2000
6/6            4s 739ms/step - kl:
0.5966 - nll: -1.3804 - total_loss: -1.3563 - val_direction: 0.0030 - val_kl:
0.5966 - val_loss: -1.1539 - val_nll: -1.1792
Epoch 475/2000
6/6            5s 797ms/step - kl:
0.5959 - nll: -1.3764 - total_loss: -1.3523 - val_direction: 0.0030 - val_kl:
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0.5967 - val_loss: -1.1515 - val_nll: -1.1768
Epoch 476/2000
6/6            4s 757ms/step - kl:
0.5957 - nll: -1.3789 - total_loss: -1.3548 - val_direction: 0.0025 - val_kl:
0.5957 - val_loss: -1.1870 - val_nll: -1.2120
Epoch 477/2000
6/6            4s 753ms/step - kl:
0.5950 - nll: -1.3805 - total_loss: -1.3565 - val_direction: 0.0029 - val_kl:
0.5954 - val_loss: -1.1628 - val_nll: -1.1881
Epoch 478/2000
6/6            4s 649ms/step - kl:
0.5943 - nll: -1.3784 - total_loss: -1.3544 - val_direction: 0.0032 - val_kl:
0.5942 - val_loss: -1.1433 - val_nll: -1.1687
Epoch 479/2000
6/6            4s 654ms/step - kl:
0.5931 - nll: -1.3784 - total_loss: -1.3545 - val_direction: 0.0025 - val_kl:
0.5932 - val_loss: -1.1865 - val_nll: -1.2114
Epoch 480/2000
6/6            4s 649ms/step - kl:
0.5927 - nll: -1.3814 - total_loss: -1.3575 - val_direction: 0.0024 - val_kl:
0.5933 - val_loss: -1.1917 - val_nll: -1.2167
Epoch 481/2000
6/6            4s 660ms/step - kl:
0.5928 - nll: -1.3807 - total_loss: -1.3567 - val_direction: 0.0031 - val_kl:
0.5937 - val_loss: -1.1493 - val_nll: -1.1745
Epoch 482/2000
6/6            4s 695ms/step - kl:
0.5929 - nll: -1.3752 - total_loss: -1.3512 - val_direction: 0.0030 - val_kl:
0.5931 - val_loss: -1.1531 - val_nll: -1.1783
Epoch 483/2000
6/6            4s 633ms/step - kl:
0.5924 - nll: -1.3767 - total_loss: -1.3528 - val_direction: 0.0026 - val_kl:
0.5928 - val_loss: -1.1747 - val_nll: -1.1998
Epoch 484/2000
6/6            4s 653ms/step - kl:
0.5921 - nll: -1.3796 - total_loss: -1.3557 - val_direction: 0.0026 - val_kl:
0.5930 - val_loss: -1.1776 - val_nll: -1.2026
Epoch 485/2000
6/6            5s 789ms/step - kl:
0.5927 - nll: -1.3794 - total_loss: -1.3555 - val_direction: 0.0029 - val_kl:
0.5938 - val_loss: -1.1568 - val_nll: -1.1820
Epoch 486/2000
6/6            4s 694ms/step - kl:
0.5933 - nll: -1.3770 - total_loss: -1.3530 - val_direction: 0.0030 - val_kl:
0.5942 - val_loss: -1.1520 - val_nll: -1.1773
Epoch 487/2000
6/6            4s 769ms/step - kl:
0.5939 - nll: -1.3779 - total_loss: -1.3539 - val_direction: 0.0028 - val_kl:
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0.5946 - val_loss: -1.1635 - val_nll: -1.1887
Epoch 488/2000
6/6            4s 671ms/step - kl:
0.5935 - nll: -1.3796 - total_loss: -1.3557 - val_direction: 0.0026 - val_kl:
0.5931 - val_loss: -1.1785 - val_nll: -1.2036
Epoch 489/2000
6/6            4s 697ms/step - kl:
0.5922 - nll: -1.3813 - total_loss: -1.3574 - val_direction: 0.0030 - val_kl:
0.5927 - val_loss: -1.1539 - val_nll: -1.1791
Epoch 490/2000
6/6            4s 677ms/step - kl:
0.5919 - nll: -1.3754 - total_loss: -1.3514 - val_direction: 0.0035 - val_kl:
0.5921 - val_loss: -1.1192 - val_nll: -1.1446
Epoch 491/2000
6/6            4s 659ms/step - kl:
0.5907 - nll: -1.3767 - total_loss: -1.3528 - val_direction: 0.0025 - val_kl:
0.5901 - val_loss: -1.1871 - val_nll: -1.2119
Epoch 492/2000
6/6            4s 648ms/step - kl:
0.5894 - nll: -1.3832 - total_loss: -1.3594 - val_direction: 0.0025 - val_kl:
0.5901 - val_loss: -1.1760 - val_nll: -1.2009
Epoch 493/2000
6/6            4s 649ms/step - kl:
0.5893 - nll: -1.3793 - total_loss: -1.3555 - val_direction: 0.0032 - val_kl:
0.5892 - val_loss: -1.1424 - val_nll: -1.1676
Epoch 494/2000
6/6            4s 639ms/step - kl:
0.5879 - nll: -1.3804 - total_loss: -1.3566 - val_direction: 0.0025 - val_kl:
0.5880 - val_loss: -1.1859 - val_nll: -1.2107
Epoch 495/2000
6/6            4s 701ms/step - kl:
0.5876 - nll: -1.3807 - total_loss: -1.3570 - val_direction: 0.0029 - val_kl:
0.5885 - val_loss: -1.1552 - val_nll: -1.1802
Epoch 496/2000
6/6            4s 736ms/step - kl:
0.5874 - nll: -1.3766 - total_loss: -1.3528 - val_direction: 0.0032 - val_kl:
0.5873 - val_loss: -1.1463 - val_nll: -1.1714
Epoch 497/2000
6/6            4s 641ms/step - kl:
0.5867 - nll: -1.3779 - total_loss: -1.3542 - val_direction: 0.0026 - val_kl:
0.5874 - val_loss: -1.1742 - val_nll: -1.1990
Epoch 498/2000
6/6            4s 747ms/step - kl:
0.5868 - nll: -1.3798 - total_loss: -1.3561 - val_direction: 0.0029 - val_kl:
0.5872 - val_loss: -1.1603 - val_nll: -1.1852
Epoch 499/2000
6/6            4s 663ms/step - kl:
0.5867 - nll: -1.3767 - total_loss: -1.3529 - val_direction: 0.0028 - val_kl:
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0.5876 - val_loss: -1.1668 - val_nll: -1.1917
Epoch 500/2000
6/6            4s 645ms/step - kl:
0.5870 - nll: -1.3786 - total_loss: -1.3549 - val_direction: 0.0026 - val_kl:
0.5875 - val_loss: -1.1776 - val_nll: -1.2024
Epoch 501/2000
6/6            4s 640ms/step - kl:
0.5870 - nll: -1.3798 - total_loss: -1.3560 - val_direction: 0.0027 - val_kl:
0.5878 - val_loss: -1.1681 - val_nll: -1.1929
Epoch 502/2000
6/6            4s 634ms/step - kl:
0.5873 - nll: -1.3784 - total_loss: -1.3546 - val_direction: 0.0030 - val_kl:
0.5878 - val_loss: -1.1546 - val_nll: -1.1796
Epoch 503/2000
6/6            4s 674ms/step - kl:
0.5871 - nll: -1.3777 - total_loss: -1.3539 - val_direction: 0.0030 - val_kl:
0.5879 - val_loss: -1.1527 - val_nll: -1.1778
Epoch 504/2000
6/6            4s 631ms/step - kl:
0.5874 - nll: -1.3766 - total_loss: -1.3528 - val_direction: 0.0030 - val_kl:
0.5878 - val_loss: -1.1505 - val_nll: -1.1755
Epoch 505/2000
6/6            4s 638ms/step - kl:
0.5870 - nll: -1.3790 - total_loss: -1.3553 - val_direction: 0.0028 - val_kl:
0.5876 - val_loss: -1.1608 - val_nll: -1.1857
Epoch 506/2000
6/6            5s 819ms/step - kl:
0.5870 - nll: -1.3796 - total_loss: -1.3559 - val_direction: 0.0027 - val_kl:
0.5874 - val_loss: -1.1704 - val_nll: -1.1953
Epoch 507/2000
6/6            4s 665ms/step - kl:
0.5867 - nll: -1.3784 - total_loss: -1.3547 - val_direction: 0.0028 - val_kl:
0.5872 - val_loss: -1.1658 - val_nll: -1.1907
Epoch 508/2000
6/6            4s 706ms/step - kl:
0.5867 - nll: -1.3788 - total_loss: -1.3551 - val_direction: 0.0030 - val_kl:
0.5875 - val_loss: -1.1548 - val_nll: -1.1798
Epoch 509/2000
6/6            4s 646ms/step - kl:
0.5870 - nll: -1.3794 - total_loss: -1.3557 - val_direction: 0.0026 - val_kl:
0.5878 - val_loss: -1.1771 - val_nll: -1.2019
Epoch 510/2000
6/6            4s 646ms/step - kl:
0.5871 - nll: -1.3774 - total_loss: -1.3537 - val_direction: 0.0030 - val_kl:
0.5872 - val_loss: -1.1490 - val_nll: -1.1740
Epoch 511/2000
6/6            4s 641ms/step - kl:
0.5860 - nll: -1.3780 - total_loss: -1.3543 - val_direction: 0.0029 - val_kl:
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0.5859 - val_loss: -1.1628 - val_nll: -1.1877
Epoch 512/2000
6/6            4s 721ms/step - kl:
0.5852 - nll: -1.3784 - total_loss: -1.3547 - val_direction: 0.0028 - val_kl:
0.5858 - val_loss: -1.1647 - val_nll: -1.1895
Epoch 513/2000
6/6            4s 686ms/step - kl:
0.5849 - nll: -1.3781 - total_loss: -1.3545 - val_direction: 0.0029 - val_kl:
0.5851 - val_loss: -1.1581 - val_nll: -1.1829
Epoch 514/2000
6/6            4s 657ms/step - kl:
0.5844 - nll: -1.3782 - total_loss: -1.3545 - val_direction: 0.0028 - val_kl:
0.5852 - val_loss: -1.1617 - val_nll: -1.1865
Epoch 515/2000
6/6            4s 637ms/step - kl:
0.5847 - nll: -1.3796 - total_loss: -1.3560 - val_direction: 0.0028 - val_kl:
0.5852 - val_loss: -1.1646 - val_nll: -1.1894
Epoch 516/2000
6/6            4s 642ms/step - kl:
0.5843 - nll: -1.3785 - total_loss: -1.3549 - val_direction: 0.0027 - val_kl:
0.5846 - val_loss: -1.1751 - val_nll: -1.1998
Epoch 517/2000
6/6            5s 767ms/step - kl:
0.5841 - nll: -1.3797 - total_loss: -1.3561 - val_direction: 0.0027 - val_kl:
0.5852 - val_loss: -1.1694 - val_nll: -1.1942
Epoch 518/2000
6/6            4s 689ms/step - kl:
0.5846 - nll: -1.3802 - total_loss: -1.3566 - val_direction: 0.0031 - val_kl:
0.5853 - val_loss: -1.1517 - val_nll: -1.1767
Epoch 519/2000
6/6            4s 715ms/step - kl:
0.5846 - nll: -1.3761 - total_loss: -1.3525 - val_direction: 0.0031 - val_kl:
0.5850 - val_loss: -1.1474 - val_nll: -1.1724
Epoch 520/2000
6/6            4s 648ms/step - kl:
0.5840 - nll: -1.3786 - total_loss: -1.3550 - val_direction: 0.0028 - val_kl:
0.5840 - val_loss: -1.1683 - val_nll: -1.1931
Epoch 521/2000
6/6            4s 658ms/step - kl:
0.5833 - nll: -1.3806 - total_loss: -1.3571 - val_direction: 0.0027 - val_kl:
0.5840 - val_loss: -1.1732 - val_nll: -1.1979
Epoch 522/2000
6/6            4s 655ms/step - kl:
0.5836 - nll: -1.3801 - total_loss: -1.3565 - val_direction: 0.0031 - val_kl:
0.5843 - val_loss: -1.1445 - val_nll: -1.1694
Epoch 523/2000
6/6            4s 637ms/step - kl:
0.5832 - nll: -1.3763 - total_loss: -1.3527 - val_direction: 0.0030 - val_kl:
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0.5833 - val_loss: -1.1559 - val_nll: -1.1807
Epoch 524/2000
6/6            4s 637ms/step - kl:
0.5827 - nll: -1.3805 - total_loss: -1.3569 - val_direction: 0.0023 - val_kl:
0.5833 - val_loss: -1.1940 - val_nll: -1.2185
Epoch 525/2000
6/6            4s 634ms/step - kl:
0.5826 - nll: -1.3792 - total_loss: -1.3557 - val_direction: 0.0031 - val_kl:
0.5825 - val_loss: -1.1508 - val_nll: -1.1756
Epoch 526/2000
6/6            4s 651ms/step - kl:
0.5812 - nll: -1.3777 - total_loss: -1.3542 - val_direction: 0.0030 - val_kl:
0.5812 - val_loss: -1.1559 - val_nll: -1.1806
Epoch 527/2000
6/6            4s 676ms/step - kl:
0.5806 - nll: -1.3794 - total_loss: -1.3560 - val_direction: 0.0026 - val_kl:
0.5813 - val_loss: -1.1771 - val_nll: -1.2017
Epoch 528/2000
6/6            5s 825ms/step - kl:
0.5807 - nll: -1.3825 - total_loss: -1.3591 - val_direction: 0.0027 - val_kl:
0.5814 - val_loss: -1.1680 - val_nll: -1.1926
Epoch 529/2000
6/6            5s 796ms/step - kl:
0.5809 - nll: -1.3818 - total_loss: -1.3584 - val_direction: 0.0029 - val_kl:
0.5817 - val_loss: -1.1596 - val_nll: -1.1843
Epoch 530/2000
6/6            4s 718ms/step - kl:
0.5810 - nll: -1.3767 - total_loss: -1.3532 - val_direction: 0.0032 - val_kl:
0.5815 - val_loss: -1.1428 - val_nll: -1.1676
Epoch 531/2000
6/6            4s 661ms/step - kl:
0.5804 - nll: -1.3736 - total_loss: -1.3501 - val_direction: 0.0026 - val_kl:
0.5802 - val_loss: -1.1825 - val_nll: -1.2070
Epoch 532/2000
6/6            4s 647ms/step - kl:
0.5794 - nll: -1.3818 - total_loss: -1.3584 - val_direction: 0.0021 - val_kl:
0.5797 - val_loss: -1.2049 - val_nll: -1.2292
Epoch 533/2000
6/6            4s 636ms/step - kl:
0.5792 - nll: -1.3813 - total_loss: -1.3579 - val_direction: 0.0029 - val_kl:
0.5796 - val_loss: -1.1576 - val_nll: -1.1823
Epoch 534/2000
6/6            4s 636ms/step - kl:
0.5788 - nll: -1.3786 - total_loss: -1.3552 - val_direction: 0.0030 - val_kl:
0.5793 - val_loss: -1.1536 - val_nll: -1.1783
Epoch 535/2000
6/6            4s 639ms/step - kl:
0.5789 - nll: -1.3773 - total_loss: -1.3538 - val_direction: 0.0028 - val_kl:
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0.5798 - val_loss: -1.1656 - val_nll: -1.1902
Epoch 536/2000
6/6            4s 652ms/step - kl:
0.5791 - nll: -1.3808 - total_loss: -1.3575 - val_direction: 0.0024 - val_kl:
0.5796 - val_loss: -1.1888 - val_nll: -1.2132
Epoch 537/2000
6/6            4s 684ms/step - kl:
0.5791 - nll: -1.3809 - total_loss: -1.3575 - val_direction: 0.0026 - val_kl:
0.5797 - val_loss: -1.1721 - val_nll: -1.1966
Epoch 538/2000
6/6            5s 792ms/step - kl:
0.5789 - nll: -1.3806 - total_loss: -1.3572 - val_direction: 0.0030 - val_kl:
0.5793 - val_loss: -1.1548 - val_nll: -1.1795
Epoch 539/2000
6/6            4s 648ms/step - kl:
0.5785 - nll: -1.3779 - total_loss: -1.3545 - val_direction: 0.0029 - val_kl:
0.5787 - val_loss: -1.1613 - val_nll: -1.1859
Epoch 540/2000
6/6            4s 695ms/step - kl:
0.5778 - nll: -1.3796 - total_loss: -1.3563 - val_direction: 0.0027 - val_kl:
0.5773 - val_loss: -1.1723 - val_nll: -1.1968
Epoch 541/2000
6/6            4s 641ms/step - kl:
0.5760 - nll: -1.3800 - total_loss: -1.3567 - val_direction: 0.0027 - val_kl:
0.5759 - val_loss: -1.1685 - val_nll: -1.1929
Epoch 542/2000
6/6            4s 643ms/step - kl:
0.5748 - nll: -1.3802 - total_loss: -1.3570 - val_direction: 0.0028 - val_kl:
0.5746 - val_loss: -1.1656 - val_nll: -1.1900
Epoch 543/2000
6/6            4s 645ms/step - kl:
0.5737 - nll: -1.3780 - total_loss: -1.3548 - val_direction: 0.0028 - val_kl:
0.5737 - val_loss: -1.1705 - val_nll: -1.1948
Epoch 544/2000
6/6            4s 647ms/step - kl:
0.5727 - nll: -1.3815 - total_loss: -1.3584 - val_direction: 0.0027 - val_kl:
0.5732 - val_loss: -1.1667 - val_nll: -1.1910
Epoch 545/2000
6/6            4s 640ms/step - kl:
0.5728 - nll: -1.3789 - total_loss: -1.3558 - val_direction: 0.0030 - val_kl:
0.5739 - val_loss: -1.1517 - val_nll: -1.1762
Epoch 546/2000
6/6            4s 634ms/step - kl:
0.5732 - nll: -1.3761 - total_loss: -1.3529 - val_direction: 0.0030 - val_kl:
0.5737 - val_loss: -1.1537 - val_nll: -1.1782
Epoch 547/2000
6/6            4s 658ms/step - kl:
0.5731 - nll: -1.3781 - total_loss: -1.3550 - val_direction: 0.0028 - val_kl:
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0.5738 - val_loss: -1.1671 - val_nll: -1.1915
Epoch 548/2000
6/6            5s 821ms/step - kl:
0.5729 - nll: -1.3786 - total_loss: -1.3555 - val_direction: 0.0027 - val_kl:
0.5730 - val_loss: -1.1682 - val_nll: -1.1925
Epoch 549/2000
6/6            4s 703ms/step - kl:
0.5724 - nll: -1.3800 - total_loss: -1.3569 - val_direction: 0.0028 - val_kl:
0.5734 - val_loss: -1.1631 - val_nll: -1.1875
Epoch 550/2000
6/6            4s 718ms/step - kl:
0.5731 - nll: -1.3799 - total_loss: -1.3567 - val_direction: 0.0032 - val_kl:
0.5739 - val_loss: -1.1412 - val_nll: -1.1658
Epoch 551/2000
6/6            4s 672ms/step - kl:
0.5732 - nll: -1.3776 - total_loss: -1.3544 - val_direction: 0.0030 - val_kl:
0.5740 - val_loss: -1.1553 - val_nll: -1.1798
Epoch 552/2000
6/6            4s 647ms/step - kl:
0.5732 - nll: -1.3788 - total_loss: -1.3556 - val_direction: 0.0025 - val_kl:
0.5737 - val_loss: -1.1850 - val_nll: -1.2092
Epoch 553/2000
6/6            4s 638ms/step - kl:
0.5731 - nll: -1.3795 - total_loss: -1.3563 - val_direction: 0.0029 - val_kl:
0.5740 - val_loss: -1.1565 - val_nll: -1.1810
Epoch 554/2000
6/6            4s 639ms/step - kl:
0.5734 - nll: -1.3798 - total_loss: -1.3566 - val_direction: 0.0026 - val_kl:
0.5742 - val_loss: -1.1795 - val_nll: -1.2037
Epoch 555/2000
6/6            4s 639ms/step - kl:
0.5736 - nll: -1.3806 - total_loss: -1.3575 - val_direction: 0.0027 - val_kl:
0.5743 - val_loss: -1.1719 - val_nll: -1.1963
Epoch 556/2000
6/6            4s 632ms/step - kl:
0.5736 - nll: -1.3781 - total_loss: -1.3549 - val_direction: 0.0031 - val_kl:
0.5742 - val_loss: -1.1491 - val_nll: -1.1735
Epoch 557/2000
6/6            5s 812ms/step - kl:
0.5732 - nll: -1.3771 - total_loss: -1.3539 - val_direction: 0.0030 - val_kl:
0.5736 - val_loss: -1.1525 - val_nll: -1.1769
Epoch 558/2000
6/6            5s 738ms/step - kl:
0.5733 - nll: -1.3786 - total_loss: -1.3554 - val_direction: 0.0025 - val_kl:
0.5741 - val_loss: -1.1850 - val_nll: -1.2092
Epoch 559/2000
6/6            4s 736ms/step - kl:
0.5733 - nll: -1.3809 - total_loss: -1.3578 - val_direction: 0.0028 - val_kl:
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0.5737 - val_loss: -1.1663 - val_nll: -1.1906
Epoch 560/2000
6/6            4s 641ms/step - kl:
0.5730 - nll: -1.3780 - total_loss: -1.3549 - val_direction: 0.0033 - val_kl:
0.5735 - val_loss: -1.1380 - val_nll: -1.1625
Epoch 561/2000
6/6            4s 642ms/step - kl:
0.5725 - nll: -1.3757 - total_loss: -1.3525 - val_direction: 0.0030 - val_kl:
0.5725 - val_loss: -1.1586 - val_nll: -1.1830
Epoch 562/2000
6/6            4s 645ms/step - kl:
0.5715 - nll: -1.3808 - total_loss: -1.3578 - val_direction: 0.0026 - val_kl:
0.5717 - val_loss: -1.1805 - val_nll: -1.2047
Epoch 563/2000
6/6            4s 631ms/step - kl:
0.5710 - nll: -1.3786 - total_loss: -1.3555 - val_direction: 0.0032 - val_kl:
0.5714 - val_loss: -1.1402 - val_nll: -1.1647
Epoch 564/2000
6/6            4s 630ms/step - kl:
0.5705 - nll: -1.3744 - total_loss: -1.3512 - val_direction: 0.0032 - val_kl:
0.5706 - val_loss: -1.1432 - val_nll: -1.1676
Epoch 565/2000
6/6            4s 639ms/step - kl:
0.5693 - nll: -1.3795 - total_loss: -1.3565 - val_direction: 0.0022 - val_kl:
0.5691 - val_loss: -1.2029 - val_nll: -1.2268
Epoch 566/2000
6/6            4s 659ms/step - kl:
0.5684 - nll: -1.3828 - total_loss: -1.3599 - val_direction: 0.0025 - val_kl:
0.5686 - val_loss: -1.1795 - val_nll: -1.2036
Epoch 567/2000
6/6            5s 787ms/step - kl:
0.5675 - nll: -1.3797 - total_loss: -1.3568 - val_direction: 0.0030 - val_kl:
0.5675 - val_loss: -1.1570 - val_nll: -1.1812
Epoch 568/2000
6/6            4s 661ms/step - kl:
0.5669 - nll: -1.3759 - total_loss: -1.3529 - val_direction: 0.0028 - val_kl:
0.5680 - val_loss: -1.1658 - val_nll: -1.1900
Epoch 569/2000
6/6            4s 739ms/step - kl:
0.5682 - nll: -1.3796 - total_loss: -1.3566 - val_direction: 0.0027 - val_kl:
0.5698 - val_loss: -1.1721 - val_nll: -1.1962
Epoch 570/2000
6/6            4s 648ms/step - kl:
0.5697 - nll: -1.3778 - total_loss: -1.3548 - val_direction: 0.0030 - val_kl:
0.5707 - val_loss: -1.1542 - val_nll: -1.1785
Epoch 571/2000
6/6            4s 642ms/step - kl:
0.5702 - nll: -1.3795 - total_loss: -1.3565 - val_direction: 0.0027 - val_kl:
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0.5710 - val_loss: -1.1742 - val_nll: -1.1984
Epoch 572/2000
6/6            4s 645ms/step - kl:
0.5707 - nll: -1.3800 - total_loss: -1.3569 - val_direction: 0.0029 - val_kl:
0.5717 - val_loss: -1.1590 - val_nll: -1.1833
Epoch 573/2000
6/6            4s 729ms/step - kl:
0.5709 - nll: -1.3778 - total_loss: -1.3547 - val_direction: 0.0030 - val_kl:
0.5709 - val_loss: -1.1539 - val_nll: -1.1782
Epoch 574/2000
6/6            5s 848ms/step - kl:
0.5695 - nll: -1.3778 - total_loss: -1.3548 - val_direction: 0.0030 - val_kl:
0.5691 - val_loss: -1.1570 - val_nll: -1.1813
Epoch 575/2000
6/6            4s 703ms/step - kl:
0.5683 - nll: -1.3792 - total_loss: -1.3562 - val_direction: 0.0027 - val_kl:
0.5684 - val_loss: -1.1695 - val_nll: -1.1936
Epoch 576/2000
6/6            4s 703ms/step - kl:
0.5670 - nll: -1.3781 - total_loss: -1.3552 - val_direction: 0.0029 - val_kl:
0.5667 - val_loss: -1.1592 - val_nll: -1.1834
Epoch 577/2000
6/6            4s 665ms/step - kl:
0.5659 - nll: -1.3778 - total_loss: -1.3549 - val_direction: 0.0026 - val_kl:
0.5665 - val_loss: -1.1813 - val_nll: -1.2053
Epoch 578/2000
6/6            4s 704ms/step - kl:
0.5664 - nll: -1.3815 - total_loss: -1.3587 - val_direction: 0.0027 - val_kl:
0.5678 - val_loss: -1.1696 - val_nll: -1.1937
Epoch 579/2000
6/6            4s 696ms/step - kl:
0.5677 - nll: -1.3793 - total_loss: -1.3564 - val_direction: 0.0032 - val_kl:
0.5685 - val_loss: -1.1428 - val_nll: -1.1671
Epoch 580/2000
6/6            4s 718ms/step - kl:
0.5673 - nll: -1.3774 - total_loss: -1.3545 - val_direction: 0.0027 - val_kl:
0.5669 - val_loss: -1.1700 - val_nll: -1.1940
Epoch 581/2000
6/6            4s 714ms/step - kl:
0.5662 - nll: -1.3802 - total_loss: -1.3573 - val_direction: 0.0026 - val_kl:
0.5668 - val_loss: -1.1769 - val_nll: -1.2008
Epoch 582/2000
6/6            4s 660ms/step - kl:
0.5658 - nll: -1.3814 - total_loss: -1.3586 - val_direction: 0.0028 - val_kl:
0.5655 - val_loss: -1.1632 - val_nll: -1.1873
Epoch 583/2000
6/6            4s 639ms/step - kl:
0.5646 - nll: -1.3770 - total_loss: -1.3542 - val_direction: 0.0031 - val_kl:
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0.5647 - val_loss: -1.1445 - val_nll: -1.1686
Epoch 584/2000
6/6            4s 644ms/step - kl:
0.5636 - nll: -1.3791 - total_loss: -1.3563 - val_direction: 0.0027 - val_kl:
0.5634 - val_loss: -1.1755 - val_nll: -1.1994
Epoch 585/2000
6/6            4s 766ms/step - kl:
0.5629 - nll: -1.3808 - total_loss: -1.3581 - val_direction: 0.0022 - val_kl:
0.5638 - val_loss: -1.2017 - val_nll: -1.2254
Epoch 586/2000
6/6            4s 723ms/step - kl:
0.5634 - nll: -1.3817 - total_loss: -1.3589 - val_direction: 0.0027 - val_kl:
0.5641 - val_loss: -1.1713 - val_nll: -1.1952
Epoch 587/2000
6/6            4s 647ms/step - kl:
0.5635 - nll: -1.3810 - total_loss: -1.3582 - val_direction: 0.0029 - val_kl:
0.5639 - val_loss: -1.1589 - val_nll: -1.1829
Epoch 588/2000
6/6            4s 762ms/step - kl:
0.5633 - nll: -1.3754 - total_loss: -1.3526 - val_direction: 0.0030 - val_kl:
0.5642 - val_loss: -1.1570 - val_nll: -1.1811
Epoch 589/2000
6/6            4s 648ms/step - kl:
0.5634 - nll: -1.3754 - total_loss: -1.3526 - val_direction: 0.0030 - val_kl:
0.5635 - val_loss: -1.1555 - val_nll: -1.1795
Epoch 590/2000
6/6            4s 646ms/step - kl:
0.5625 - nll: -1.3775 - total_loss: -1.3547 - val_direction: 0.0025 - val_kl:
0.5628 - val_loss: -1.1831 - val_nll: -1.2068
Epoch 591/2000
6/6            4s 644ms/step - kl:
0.5622 - nll: -1.3803 - total_loss: -1.3576 - val_direction: 0.0025 - val_kl:
0.5626 - val_loss: -1.1839 - val_nll: -1.2077
Epoch 592/2000
6/6            4s 637ms/step - kl:
0.5616 - nll: -1.3796 - total_loss: -1.3570 - val_direction: 0.0026 - val_kl:
0.5613 - val_loss: -1.1762 - val_nll: -1.2000
Epoch 593/2000
6/6            4s 634ms/step - kl:
0.5605 - nll: -1.3783 - total_loss: -1.3556 - val_direction: 0.0028 - val_kl:
0.5610 - val_loss: -1.1642 - val_nll: -1.1881
Epoch 594/2000
6/6            4s 635ms/step - kl:
0.5603 - nll: -1.3785 - total_loss: -1.3558 - val_direction: 0.0030 - val_kl:
0.5607 - val_loss: -1.1542 - val_nll: -1.1782
Epoch 595/2000
6/6            4s 636ms/step - kl:
0.5601 - nll: -1.3770 - total_loss: -1.3544 - val_direction: 0.0027 - val_kl:
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0.5606 - val_loss: -1.1743 - val_nll: -1.1980
Epoch 596/2000
6/6            5s 816ms/step - kl:
0.5599 - nll: -1.3795 - total_loss: -1.3569 - val_direction: 0.0028 - val_kl:
0.5605 - val_loss: -1.1668 - val_nll: -1.1907
Epoch 597/2000
6/6            4s 643ms/step - kl:
0.5600 - nll: -1.3786 - total_loss: -1.3559 - val_direction: 0.0030 - val_kl:
0.5605 - val_loss: -1.1558 - val_nll: -1.1797
Epoch 598/2000
6/6            4s 723ms/step - kl:
0.5598 - nll: -1.3815 - total_loss: -1.3589 - val_direction: 0.0025 - val_kl:
0.5607 - val_loss: -1.1854 - val_nll: -1.2091
Epoch 599/2000
6/6            4s 649ms/step - kl:
0.5604 - nll: -1.3807 - total_loss: -1.3581 - val_direction: 0.0031 - val_kl:
0.5612 - val_loss: -1.1467 - val_nll: -1.1706
Epoch 600/2000
6/6            4s 641ms/step - kl:
0.5604 - nll: -1.3757 - total_loss: -1.3530 - val_direction: 0.0029 - val_kl:
0.5606 - val_loss: -1.1627 - val_nll: -1.1865
Epoch 601/2000
6/6            4s 648ms/step - kl:
0.5602 - nll: -1.3810 - total_loss: -1.3584 - val_direction: 0.0023 - val_kl:
0.5611 - val_loss: -1.1956 - val_nll: -1.2192
Epoch 602/2000
6/6            4s 635ms/step - kl:
0.5606 - nll: -1.3834 - total_loss: -1.3608 - val_direction: 0.0026 - val_kl:
0.5607 - val_loss: -1.1765 - val_nll: -1.2002
Epoch 603/2000
6/6            4s 657ms/step - kl:
0.5600 - nll: -1.3787 - total_loss: -1.3561 - val_direction: 0.0034 - val_kl:
0.5610 - val_loss: -1.1301 - val_nll: -1.1543
Epoch 604/2000
6/6            4s 643ms/step - kl:
0.5602 - nll: -1.3713 - total_loss: -1.3485 - val_direction: 0.0032 - val_kl:
0.5601 - val_loss: -1.1469 - val_nll: -1.1708
Epoch 605/2000
6/6            4s 634ms/step - kl:
0.5588 - nll: -1.3797 - total_loss: -1.3571 - val_direction: 0.0022 - val_kl:
0.5590 - val_loss: -1.2016 - val_nll: -1.2251
Epoch 606/2000
6/6            5s 812ms/step - kl:
0.5589 - nll: -1.3823 - total_loss: -1.3597 - val_direction: 0.0027 - val_kl:
0.5600 - val_loss: -1.1687 - val_nll: -1.1924
Epoch 607/2000
6/6            4s 742ms/step - kl:
0.5590 - nll: -1.3780 - total_loss: -1.3554 - val_direction: 0.0030 - val_kl:
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0.5591 - val_loss: -1.1545 - val_nll: -1.1784
Epoch 608/2000
6/6            4s 717ms/step - kl:
0.5583 - nll: -1.3808 - total_loss: -1.3582 - val_direction: 0.0025 - val_kl:
0.5590 - val_loss: -1.1845 - val_nll: -1.2081
Epoch 609/2000
6/6            4s 652ms/step - kl:
0.5587 - nll: -1.3801 - total_loss: -1.3575 - val_direction: 0.0031 - val_kl:
0.5593 - val_loss: -1.1415 - val_nll: -1.1654
Epoch 610/2000
6/6            4s 657ms/step - kl:
0.5580 - nll: -1.3778 - total_loss: -1.3552 - val_direction: 0.0027 - val_kl:
0.5576 - val_loss: -1.1735 - val_nll: -1.1971
Epoch 611/2000
6/6            4s 660ms/step - kl:
0.5571 - nll: -1.3821 - total_loss: -1.3596 - val_direction: 0.0025 - val_kl:
0.5581 - val_loss: -1.1832 - val_nll: -1.2068
Epoch 612/2000
6/6            4s 640ms/step - kl:
0.5571 - nll: -1.3798 - total_loss: -1.3573 - val_direction: 0.0034 - val_kl:
0.5571 - val_loss: -1.1282 - val_nll: -1.1522
Epoch 613/2000
6/6            4s 633ms/step - kl:
0.5561 - nll: -1.3768 - total_loss: -1.3543 - val_direction: 0.0028 - val_kl:
0.5565 - val_loss: -1.1700 - val_nll: -1.1936
Epoch 614/2000
6/6            4s 644ms/step - kl:
0.5561 - nll: -1.3813 - total_loss: -1.3589 - val_direction: 0.0024 - val_kl:
0.5571 - val_loss: -1.1882 - val_nll: -1.2117
Epoch 615/2000
6/6            4s 634ms/step - kl:
0.5567 - nll: -1.3815 - total_loss: -1.3590 - val_direction: 0.0026 - val_kl:
0.5573 - val_loss: -1.1759 - val_nll: -1.1995
Epoch 616/2000
6/6            4s 738ms/step - kl:
0.5565 - nll: -1.3801 - total_loss: -1.3576 - val_direction: 0.0028 - val_kl:
0.5568 - val_loss: -1.1684 - val_nll: -1.1920
Epoch 617/2000
6/6            5s 810ms/step - kl:
0.5563 - nll: -1.3787 - total_loss: -1.3562 - val_direction: 0.0029 - val_kl:
0.5573 - val_loss: -1.1565 - val_nll: -1.1802
Epoch 618/2000
6/6            4s 703ms/step - kl:
0.5564 - nll: -1.3780 - total_loss: -1.3555 - val_direction: 0.0028 - val_kl:
0.5564 - val_loss: -1.1687 - val_nll: -1.1924
Epoch 619/2000
6/6            4s 716ms/step - kl:
0.5557 - nll: -1.3794 - total_loss: -1.3569 - val_direction: 0.0027 - val_kl:
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0.5566 - val_loss: -1.1723 - val_nll: -1.1959
Epoch 620/2000
6/6            4s 648ms/step - kl:
0.5560 - nll: -1.3796 - total_loss: -1.3572 - val_direction: 0.0027 - val_kl:
0.5566 - val_loss: -1.1706 - val_nll: -1.1942
Epoch 621/2000
6/6            4s 644ms/step - kl:
0.5558 - nll: -1.3807 - total_loss: -1.3583 - val_direction: 0.0027 - val_kl:
0.5562 - val_loss: -1.1754 - val_nll: -1.1990
Epoch 622/2000
6/6            4s 646ms/step - kl:
0.5557 - nll: -1.3780 - total_loss: -1.3555 - val_direction: 0.0030 - val_kl:
0.5565 - val_loss: -1.1530 - val_nll: -1.1768
Epoch 623/2000
6/6            4s 635ms/step - kl:
0.5557 - nll: -1.3784 - total_loss: -1.3559 - val_direction: 0.0028 - val_kl:
0.5557 - val_loss: -1.1662 - val_nll: -1.1899
Epoch 624/2000
6/6            4s 635ms/step - kl:
0.5550 - nll: -1.3805 - total_loss: -1.3580 - val_direction: 0.0027 - val_kl:
0.5557 - val_loss: -1.1755 - val_nll: -1.1991
Epoch 625/2000
6/6            4s 639ms/step - kl:
0.5551 - nll: -1.3801 - total_loss: -1.3577 - val_direction: 0.0032 - val_kl:
0.5556 - val_loss: -1.1461 - val_nll: -1.1699
Epoch 626/2000
6/6            5s 819ms/step - kl:
0.5549 - nll: -1.3780 - total_loss: -1.3555 - val_direction: 0.0031 - val_kl:
0.5555 - val_loss: -1.1504 - val_nll: -1.1741
Epoch 627/2000
6/6            5s 753ms/step - kl:
0.5547 - nll: -1.3770 - total_loss: -1.3545 - val_direction: 0.0028 - val_kl:
0.5548 - val_loss: -1.1663 - val_nll: -1.1899
Epoch 628/2000
6/6            4s 723ms/step - kl:
0.5532 - nll: -1.3823 - total_loss: -1.3600 - val_direction: 0.0024 - val_kl:
0.5525 - val_loss: -1.1912 - val_nll: -1.2145
Epoch 629/2000
6/6            4s 644ms/step - kl:
0.5516 - nll: -1.3811 - total_loss: -1.3589 - val_direction: 0.0030 - val_kl:
0.5520 - val_loss: -1.1578 - val_nll: -1.1813
Epoch 630/2000
6/6            4s 642ms/step - kl:
0.5514 - nll: -1.3779 - total_loss: -1.3556 - val_direction: 0.0028 - val_kl:
0.5519 - val_loss: -1.1681 - val_nll: -1.1916
Epoch 631/2000
6/6            4s 649ms/step - kl:
0.5512 - nll: -1.3796 - total_loss: -1.3573 - val_direction: 0.0026 - val_kl:
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0.5519 - val_loss: -1.1755 - val_nll: -1.1989
Epoch 632/2000
6/6            4s 635ms/step - kl:
0.5518 - nll: -1.3792 - total_loss: -1.3569 - val_direction: 0.0029 - val_kl:
0.5529 - val_loss: -1.1553 - val_nll: -1.1789
Epoch 633/2000
6/6            4s 657ms/step - kl:
0.5522 - nll: -1.3793 - total_loss: -1.3570 - val_direction: 0.0028 - val_kl:
0.5526 - val_loss: -1.1682 - val_nll: -1.1917
Epoch 634/2000
6/6            4s 638ms/step - kl:
0.5522 - nll: -1.3779 - total_loss: -1.3555 - val_direction: 0.0029 - val_kl:
0.5530 - val_loss: -1.1666 - val_nll: -1.1902
Epoch 635/2000
6/6            4s 636ms/step - kl:
0.5520 - nll: -1.3784 - total_loss: -1.3560 - val_direction: 0.0028 - val_kl:
0.5520 - val_loss: -1.1698 - val_nll: -1.1933
Epoch 636/2000
6/6            4s 695ms/step - kl:
0.5515 - nll: -1.3798 - total_loss: -1.3575 - val_direction: 0.0025 - val_kl:
0.5521 - val_loss: -1.1823 - val_nll: -1.2057
Epoch 637/2000
6/6            5s 780ms/step - kl:
0.5511 - nll: -1.3803 - total_loss: -1.3581 - val_direction: 0.0030 - val_kl:
0.5510 - val_loss: -1.1562 - val_nll: -1.1797
Epoch 638/2000
6/6            4s 661ms/step - kl:
0.5501 - nll: -1.3791 - total_loss: -1.3569 - val_direction: 0.0029 - val_kl:
0.5507 - val_loss: -1.1608 - val_nll: -1.1843
Epoch 639/2000
6/6            4s 667ms/step - kl:
0.5505 - nll: -1.3778 - total_loss: -1.3555 - val_direction: 0.0030 - val_kl:
0.5516 - val_loss: -1.1520 - val_nll: -1.1756
Epoch 640/2000
6/6            4s 659ms/step - kl:
0.5510 - nll: -1.3793 - total_loss: -1.3570 - val_direction: 0.0029 - val_kl:
0.5519 - val_loss: -1.1634 - val_nll: -1.1869
Epoch 641/2000
6/6            4s 656ms/step - kl:
0.5513 - nll: -1.3777 - total_loss: -1.3554 - val_direction: 0.0030 - val_kl:
0.5515 - val_loss: -1.1574 - val_nll: -1.1809
Epoch 642/2000
6/6            4s 642ms/step - kl:
0.5500 - nll: -1.3792 - total_loss: -1.3570 - val_direction: 0.0026 - val_kl:
0.5495 - val_loss: -1.1815 - val_nll: -1.2048
Epoch 643/2000
6/6            4s 631ms/step - kl:
0.5487 - nll: -1.3822 - total_loss: -1.3600 - val_direction: 0.0027 - val_kl:
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0.5496 - val_loss: -1.1724 - val_nll: -1.1958
Epoch 644/2000
6/6            4s 635ms/step - kl:
0.5494 - nll: -1.3776 - total_loss: -1.3553 - val_direction: 0.0030 - val_kl:
0.5503 - val_loss: -1.1560 - val_nll: -1.1795
Epoch 645/2000
6/6            4s 633ms/step - kl:
0.5497 - nll: -1.3780 - total_loss: -1.3557 - val_direction: 0.0030 - val_kl:
0.5508 - val_loss: -1.1546 - val_nll: -1.1782
Epoch 646/2000
6/6            4s 639ms/step - kl:
0.5508 - nll: -1.3765 - total_loss: -1.3541 - val_direction: 0.0028 - val_kl:
0.5518 - val_loss: -1.1653 - val_nll: -1.1888
Epoch 647/2000
6/6            5s 794ms/step - kl:
0.5513 - nll: -1.3797 - total_loss: -1.3574 - val_direction: 0.0024 - val_kl:
0.5522 - val_loss: -1.1893 - val_nll: -1.2126
Epoch 648/2000
6/6            4s 685ms/step - kl:
0.5521 - nll: -1.3817 - total_loss: -1.3594 - val_direction: 0.0029 - val_kl:
0.5535 - val_loss: -1.1589 - val_nll: -1.1825
Epoch 649/2000
6/6            4s 702ms/step - kl:
0.5529 - nll: -1.3813 - total_loss: -1.3589 - val_direction: 0.0029 - val_kl:
0.5536 - val_loss: -1.1594 - val_nll: -1.1830
Epoch 650/2000
6/6            4s 647ms/step - kl:
0.5530 - nll: -1.3756 - total_loss: -1.3532 - val_direction: 0.0032 - val_kl:
0.5535 - val_loss: -1.1433 - val_nll: -1.1671
Epoch 651/2000
6/6            4s 643ms/step - kl:
0.5526 - nll: -1.3793 - total_loss: -1.3569 - val_direction: 0.0025 - val_kl:
0.5526 - val_loss: -1.1864 - val_nll: -1.2098
Epoch 652/2000
6/6            4s 642ms/step - kl:
0.5519 - nll: -1.3816 - total_loss: -1.3594 - val_direction: 0.0025 - val_kl:
0.5522 - val_loss: -1.1837 - val_nll: -1.2070
Epoch 653/2000
6/6            4s 630ms/step - kl:
0.5510 - nll: -1.3807 - total_loss: -1.3585 - val_direction: 0.0030 - val_kl:
0.5502 - val_loss: -1.1585 - val_nll: -1.1819
Epoch 654/2000
6/6            4s 632ms/step - kl:
0.5489 - nll: -1.3786 - total_loss: -1.3564 - val_direction: 0.0029 - val_kl:
0.5488 - val_loss: -1.1584 - val_nll: -1.1818
Epoch 655/2000
6/6            4s 630ms/step - kl:
0.5480 - nll: -1.3771 - total_loss: -1.3549 - val_direction: 0.0029 - val_kl:
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0.5479 - val_loss: -1.1590 - val_nll: -1.1824
Epoch 656/2000
6/6            4s 657ms/step - kl:
0.5470 - nll: -1.3792 - total_loss: -1.3571 - val_direction: 0.0027 - val_kl:
0.5471 - val_loss: -1.1759 - val_nll: -1.1992
Epoch 657/2000
6/6            4s 730ms/step - kl:
0.5465 - nll: -1.3815 - total_loss: -1.3595 - val_direction: 0.0025 - val_kl:
0.5474 - val_loss: -1.1861 - val_nll: -1.2093
Epoch 658/2000
6/6            4s 708ms/step - kl:
0.5473 - nll: -1.3802 - total_loss: -1.3581 - val_direction: 0.0029 - val_kl:
0.5485 - val_loss: -1.1629 - val_nll: -1.1862
Epoch 659/2000
6/6            4s 742ms/step - kl:
0.5483 - nll: -1.3762 - total_loss: -1.3540 - val_direction: 0.0031 - val_kl:
0.5495 - val_loss: -1.1501 - val_nll: -1.1736
Epoch 660/2000
6/6            4s 642ms/step - kl:
0.5489 - nll: -1.3777 - total_loss: -1.3555 - val_direction: 0.0027 - val_kl:
0.5492 - val_loss: -1.1758 - val_nll: -1.1991
Epoch 661/2000
6/6            4s 643ms/step - kl:
0.5484 - nll: -1.3799 - total_loss: -1.3578 - val_direction: 0.0026 - val_kl:
0.5491 - val_loss: -1.1769 - val_nll: -1.2002
Epoch 662/2000
6/6            4s 644ms/step - kl:
0.5483 - nll: -1.3807 - total_loss: -1.3586 - val_direction: 0.0029 - val_kl:
0.5485 - val_loss: -1.1626 - val_nll: -1.1860
Epoch 663/2000
6/6            4s 648ms/step - kl:
0.5476 - nll: -1.3796 - total_loss: -1.3574 - val_direction: 0.0029 - val_kl:
0.5480 - val_loss: -1.1618 - val_nll: -1.1851
Epoch 664/2000
6/6            4s 642ms/step - kl:
0.5473 - nll: -1.3784 - total_loss: -1.3563 - val_direction: 0.0029 - val_kl:
0.5479 - val_loss: -1.1597 - val_nll: -1.1831
Epoch 665/2000
6/6            4s 634ms/step - kl:
0.5468 - nll: -1.3777 - total_loss: -1.3556 - val_direction: 0.0027 - val_kl:
0.5463 - val_loss: -1.1731 - val_nll: -1.1963
Epoch 666/2000
6/6            4s 631ms/step - kl:
0.5450 - nll: -1.3805 - total_loss: -1.3585 - val_direction: 0.0025 - val_kl:
0.5449 - val_loss: -1.1818 - val_nll: -1.2049
Epoch 667/2000
6/6            4s 700ms/step - kl:
0.5443 - nll: -1.3822 - total_loss: -1.3602 - val_direction: 0.0026 - val_kl:
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0.5451 - val_loss: -1.1776 - val_nll: -1.2007
Epoch 668/2000
6/6            5s 773ms/step - kl:
0.5447 - nll: -1.3814 - total_loss: -1.3594 - val_direction: 0.0030 - val_kl:
0.5457 - val_loss: -1.1529 - val_nll: -1.1763
Epoch 669/2000
6/6            4s 656ms/step - kl:
0.5447 - nll: -1.3792 - total_loss: -1.3572 - val_direction: 0.0028 - val_kl:
0.5447 - val_loss: -1.1686 - val_nll: -1.1918
Epoch 670/2000
6/6            4s 719ms/step - kl:
0.5444 - nll: -1.3802 - total_loss: -1.3582 - val_direction: 0.0028 - val_kl:
0.5456 - val_loss: -1.1658 - val_nll: -1.1890
Epoch 671/2000
6/6            4s 665ms/step - kl:
0.5451 - nll: -1.3777 - total_loss: -1.3557 - val_direction: 0.0033 - val_kl:
0.5458 - val_loss: -1.1393 - val_nll: -1.1627
Epoch 672/2000
6/6            4s 644ms/step - kl:
0.5453 - nll: -1.3769 - total_loss: -1.3548 - val_direction: 0.0028 - val_kl:
0.5459 - val_loss: -1.1673 - val_nll: -1.1906
Epoch 673/2000
6/6            4s 640ms/step - kl:
0.5454 - nll: -1.3821 - total_loss: -1.3601 - val_direction: 0.0022 - val_kl:
0.5457 - val_loss: -1.2003 - val_nll: -1.2233
Epoch 674/2000
6/6            4s 637ms/step - kl:
0.5450 - nll: -1.3817 - total_loss: -1.3597 - val_direction: 0.0031 - val_kl:
0.5456 - val_loss: -1.1443 - val_nll: -1.1676
Epoch 675/2000
6/6            4s 634ms/step - kl:
0.5445 - nll: -1.3770 - total_loss: -1.3550 - val_direction: 0.0032 - val_kl:
0.5445 - val_loss: -1.1451 - val_nll: -1.1684
Epoch 676/2000
6/6            4s 629ms/step - kl:
0.5437 - nll: -1.3781 - total_loss: -1.3561 - val_direction: 0.0024 - val_kl:
0.5438 - val_loss: -1.1839 - val_nll: -1.2069
Epoch 677/2000
6/6            4s 632ms/step - kl:
0.5431 - nll: -1.3812 - total_loss: -1.3593 - val_direction: 0.0028 - val_kl:
0.5440 - val_loss: -1.1618 - val_nll: -1.1849
Epoch 678/2000
6/6            5s 821ms/step - kl:
0.5434 - nll: -1.3777 - total_loss: -1.3557 - val_direction: 0.0031 - val_kl:
0.5438 - val_loss: -1.1465 - val_nll: -1.1698
Epoch 679/2000
6/6            5s 804ms/step - kl:
0.5429 - nll: -1.3793 - total_loss: -1.3573 - val_direction: 0.0023 - val_kl:
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0.5438 - val_loss: -1.1914 - val_nll: -1.2144
Epoch 680/2000
6/6            4s 649ms/step - kl:
0.5439 - nll: -1.3809 - total_loss: -1.3589 - val_direction: 0.0030 - val_kl:
0.5454 - val_loss: -1.1537 - val_nll: -1.1770
Epoch 681/2000
6/6            4s 677ms/step - kl:
0.5448 - nll: -1.3781 - total_loss: -1.3561 - val_direction: 0.0029 - val_kl:
0.5451 - val_loss: -1.1670 - val_nll: -1.1902
Epoch 682/2000
6/6            4s 648ms/step - kl:
0.5446 - nll: -1.3798 - total_loss: -1.3578 - val_direction: 0.0024 - val_kl:
0.5453 - val_loss: -1.1918 - val_nll: -1.2148
Epoch 683/2000
6/6            4s 642ms/step - kl:
0.5444 - nll: -1.3806 - total_loss: -1.3587 - val_direction: 0.0030 - val_kl:
0.5441 - val_loss: -1.1542 - val_nll: -1.1774
Epoch 684/2000
6/6            4s 740ms/step - kl:
0.5431 - nll: -1.3785 - total_loss: -1.3565 - val_direction: 0.0030 - val_kl:
0.5433 - val_loss: -1.1577 - val_nll: -1.1809
Epoch 685/2000
6/6            4s 704ms/step - kl:
0.5424 - nll: -1.3768 - total_loss: -1.3548 - val_direction: 0.0029 - val_kl:
0.5423 - val_loss: -1.1579 - val_nll: -1.1810
Epoch 686/2000
6/6            4s 653ms/step - kl:
0.5415 - nll: -1.3797 - total_loss: -1.3578 - val_direction: 0.0023 - val_kl:
0.5422 - val_loss: -1.1980 - val_nll: -1.2209
Epoch 687/2000
6/6            4s 638ms/step - kl:
0.5423 - nll: -1.3815 - total_loss: -1.3596 - val_direction: 0.0028 - val_kl:
0.5437 - val_loss: -1.1672 - val_nll: -1.1903
Epoch 688/2000
6/6            5s 832ms/step - kl:
0.5428 - nll: -1.3791 - total_loss: -1.3571 - val_direction: 0.0028 - val_kl:
0.5429 - val_loss: -1.1662 - val_nll: -1.1893
Epoch 689/2000
6/6            5s 810ms/step - kl:
0.5424 - nll: -1.3784 - total_loss: -1.3565 - val_direction: 0.0030 - val_kl:
0.5435 - val_loss: -1.1576 - val_nll: -1.1808
Epoch 690/2000
6/6            4s 667ms/step - kl:
0.5429 - nll: -1.3788 - total_loss: -1.3569 - val_direction: 0.0028 - val_kl:
0.5432 - val_loss: -1.1676 - val_nll: -1.1907
Epoch 691/2000
6/6            4s 672ms/step - kl:
0.5422 - nll: -1.3807 - total_loss: -1.3588 - val_direction: 0.0025 - val_kl:
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0.5423 - val_loss: -1.1836 - val_nll: -1.2066
Epoch 692/2000
6/6            4s 640ms/step - kl:
0.5417 - nll: -1.3793 - total_loss: -1.3574 - val_direction: 0.0029 - val_kl:
0.5423 - val_loss: -1.1547 - val_nll: -1.1779
Epoch 693/2000
6/6            4s 659ms/step - kl:
0.5413 - nll: -1.3773 - total_loss: -1.3554 - val_direction: 0.0031 - val_kl:
0.5412 - val_loss: -1.1541 - val_nll: -1.1773
Epoch 694/2000
6/6            4s 639ms/step - kl:
0.5401 - nll: -1.3801 - total_loss: -1.3583 - val_direction: 0.0021 - val_kl:
0.5400 - val_loss: -1.2080 - val_nll: -1.2307
Epoch 695/2000
6/6            4s 634ms/step - kl:
0.5390 - nll: -1.3825 - total_loss: -1.3608 - val_direction: 0.0027 - val_kl:
0.5391 - val_loss: -1.1748 - val_nll: -1.1977
Epoch 696/2000
6/6            4s 631ms/step - kl:
0.5385 - nll: -1.3796 - total_loss: -1.3579 - val_direction: 0.0030 - val_kl:
0.5392 - val_loss: -1.1586 - val_nll: -1.1816
Epoch 697/2000
6/6            4s 632ms/step - kl:
0.5388 - nll: -1.3777 - total_loss: -1.3558 - val_direction: 0.0029 - val_kl:
0.5398 - val_loss: -1.1653 - val_nll: -1.1883
Epoch 698/2000
6/6            4s 702ms/step - kl:
0.5393 - nll: -1.3784 - total_loss: -1.3565 - val_direction: 0.0025 - val_kl:
0.5396 - val_loss: -1.1861 - val_nll: -1.2089
Epoch 699/2000
6/6            5s 818ms/step - kl:
0.5387 - nll: -1.3828 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.5391 - val_loss: -1.1691 - val_nll: -1.1920
Epoch 700/2000
6/6            4s 660ms/step - kl:
0.5385 - nll: -1.3778 - total_loss: -1.3560 - val_direction: 0.0033 - val_kl:
0.5388 - val_loss: -1.1322 - val_nll: -1.1555
Epoch 701/2000
6/6            4s 735ms/step - kl:
0.5373 - nll: -1.3768 - total_loss: -1.3551 - val_direction: 0.0029 - val_kl:
0.5369 - val_loss: -1.1663 - val_nll: -1.1892
Epoch 702/2000
6/6            4s 641ms/step - kl:
0.5365 - nll: -1.3799 - total_loss: -1.3582 - val_direction: 0.0025 - val_kl:
0.5375 - val_loss: -1.1863 - val_nll: -1.2090
Epoch 703/2000
6/6            4s 650ms/step - kl:
0.5372 - nll: -1.3790 - total_loss: -1.3573 - val_direction: 0.0029 - val_kl:
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0.5377 - val_loss: -1.1629 - val_nll: -1.1858
Epoch 704/2000
6/6            4s 638ms/step - kl:
0.5373 - nll: -1.3794 - total_loss: -1.3576 - val_direction: 0.0027 - val_kl:
0.5384 - val_loss: -1.1738 - val_nll: -1.1966
Epoch 705/2000
6/6            4s 631ms/step - kl:
0.5382 - nll: -1.3797 - total_loss: -1.3580 - val_direction: 0.0027 - val_kl:
0.5395 - val_loss: -1.1728 - val_nll: -1.1957
Epoch 706/2000
6/6            4s 631ms/step - kl:
0.5395 - nll: -1.3789 - total_loss: -1.3571 - val_direction: 0.0030 - val_kl:
0.5403 - val_loss: -1.1549 - val_nll: -1.1781
Epoch 707/2000
6/6            4s 630ms/step - kl:
0.5394 - nll: -1.3782 - total_loss: -1.3563 - val_direction: 0.0025 - val_kl:
0.5395 - val_loss: -1.1884 - val_nll: -1.2113
Epoch 708/2000
6/6            4s 661ms/step - kl:
0.5391 - nll: -1.3824 - total_loss: -1.3607 - val_direction: 0.0027 - val_kl:
0.5396 - val_loss: -1.1677 - val_nll: -1.1907
Epoch 709/2000
6/6            5s 815ms/step - kl:
0.5386 - nll: -1.3787 - total_loss: -1.3569 - val_direction: 0.0031 - val_kl:
0.5386 - val_loss: -1.1498 - val_nll: -1.1729
Epoch 710/2000
6/6            5s 755ms/step - kl:
0.5379 - nll: -1.3782 - total_loss: -1.3564 - val_direction: 0.0027 - val_kl:
0.5382 - val_loss: -1.1735 - val_nll: -1.1964
Epoch 711/2000
6/6            4s 719ms/step - kl:
0.5379 - nll: -1.3794 - total_loss: -1.3576 - val_direction: 0.0030 - val_kl:
0.5390 - val_loss: -1.1546 - val_nll: -1.1776
Epoch 712/2000
6/6            4s 642ms/step - kl:
0.5384 - nll: -1.3787 - total_loss: -1.3569 - val_direction: 0.0026 - val_kl:
0.5385 - val_loss: -1.1802 - val_nll: -1.2030
Epoch 713/2000
6/6            4s 640ms/step - kl:
0.5376 - nll: -1.3798 - total_loss: -1.3581 - val_direction: 0.0027 - val_kl:
0.5379 - val_loss: -1.1708 - val_nll: -1.1937
Epoch 714/2000
6/6            4s 643ms/step - kl:
0.5369 - nll: -1.3820 - total_loss: -1.3603 - val_direction: 0.0027 - val_kl:
0.5371 - val_loss: -1.1732 - val_nll: -1.1960
Epoch 715/2000
6/6            4s 644ms/step - kl:
0.5364 - nll: -1.3803 - total_loss: -1.3587 - val_direction: 0.0030 - val_kl:
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0.5370 - val_loss: -1.1569 - val_nll: -1.1798
Epoch 716/2000
6/6            4s 644ms/step - kl:
0.5362 - nll: -1.3788 - total_loss: -1.3571 - val_direction: 0.0028 - val_kl:
0.5366 - val_loss: -1.1713 - val_nll: -1.1942
Epoch 717/2000
6/6            4s 630ms/step - kl:
0.5358 - nll: -1.3783 - total_loss: -1.3566 - val_direction: 0.0026 - val_kl:
0.5360 - val_loss: -1.1775 - val_nll: -1.2002
Epoch 718/2000
6/6            4s 636ms/step - kl:
0.5354 - nll: -1.3808 - total_loss: -1.3591 - val_direction: 0.0026 - val_kl:
0.5363 - val_loss: -1.1817 - val_nll: -1.2045
Epoch 719/2000
6/6            5s 812ms/step - kl:
0.5362 - nll: -1.3798 - total_loss: -1.3582 - val_direction: 0.0029 - val_kl:
0.5370 - val_loss: -1.1592 - val_nll: -1.1821
Epoch 720/2000
6/6            5s 807ms/step - kl:
0.5361 - nll: -1.3786 - total_loss: -1.3569 - val_direction: 0.0030 - val_kl:
0.5360 - val_loss: -1.1600 - val_nll: -1.1829
Epoch 721/2000
6/6            4s 676ms/step - kl:
0.5354 - nll: -1.3793 - total_loss: -1.3576 - val_direction: 0.0028 - val_kl:
0.5361 - val_loss: -1.1684 - val_nll: -1.1912
Epoch 722/2000
6/6            4s 652ms/step - kl:
0.5354 - nll: -1.3797 - total_loss: -1.3581 - val_direction: 0.0029 - val_kl:
0.5356 - val_loss: -1.1595 - val_nll: -1.1824
Epoch 723/2000
6/6            4s 665ms/step - kl:
0.5348 - nll: -1.3796 - total_loss: -1.3580 - val_direction: 0.0029 - val_kl:
0.5352 - val_loss: -1.1597 - val_nll: -1.1826
Epoch 724/2000
6/6            4s 643ms/step - kl:
0.5348 - nll: -1.3793 - total_loss: -1.3577 - val_direction: 0.0027 - val_kl:
0.5353 - val_loss: -1.1744 - val_nll: -1.1971
Epoch 725/2000
6/6            4s 637ms/step - kl:
0.5348 - nll: -1.3807 - total_loss: -1.3591 - val_direction: 0.0028 - val_kl:
0.5354 - val_loss: -1.1655 - val_nll: -1.1883
Epoch 726/2000
6/6            4s 633ms/step - kl:
0.5346 - nll: -1.3777 - total_loss: -1.3560 - val_direction: 0.0030 - val_kl:
0.5345 - val_loss: -1.1634 - val_nll: -1.1862
Epoch 727/2000
6/6            4s 631ms/step - kl:
0.5337 - nll: -1.3796 - total_loss: -1.3580 - val_direction: 0.0026 - val_kl:
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0.5341 - val_loss: -1.1791 - val_nll: -1.2018
Epoch 728/2000
6/6             4s 632ms/step - kl:
0.5332 - nll: -1.3800 - total_loss: -1.3584 - val_direction: 0.0026 - val_kl:
0.5331 - val_loss: -1.1811 - val_nll: -1.2037
Epoch 729/2000
6/6             4s 779ms/step - kl:
0.5325 - nll: -1.3825 - total_loss: -1.3610 - val_direction: 0.0026 - val_kl:
0.5330 - val_loss: -1.1819 - val_nll: -1.2045
Epoch 730/2000
6/6             5s 772ms/step - kl:
0.5325 - nll: -1.3793 - total_loss: -1.3578 - val_direction: 0.0031 - val_kl:
0.5331 - val_loss: -1.1499 - val_nll: -1.1727
Epoch 731/2000
6/6             4s 680ms/step - kl:
0.5324 - nll: -1.3804 - total_loss: -1.3589 - val_direction: 0.0029 - val_kl:
0.5327 - val_loss: -1.1651 - val_nll: -1.1878
Epoch 732/2000
6/6             4s 710ms/step - kl:
0.5318 - nll: -1.3765 - total_loss: -1.3549 - val_direction: 0.0031 - val_kl:
0.5316 - val_loss: -1.1476 - val_nll: -1.1705
Epoch 733/2000
6/6             4s 649ms/step - kl:
0.5305 - nll: -1.3786 - total_loss: -1.3572 - val_direction: 0.0025 - val_kl:
0.5309 - val_loss: -1.1866 - val_nll: -1.2091
Epoch 734/2000
6/6             4s 645ms/step - kl:
0.5306 - nll: -1.3791 - total_loss: -1.3577 - val_direction: 0.0027 - val_kl:
0.5318 - val_loss: -1.1680 - val_nll: -1.1906
Epoch 735/2000
6/6             4s 635ms/step - kl:
0.5312 - nll: -1.3821 - total_loss: -1.3606 - val_direction: 0.0026 - val_kl:
0.5321 - val_loss: -1.1776 - val_nll: -1.2002
Epoch 736/2000
6/6             4s 635ms/step - kl:
0.5324 - nll: -1.3814 - total_loss: -1.3598 - val_direction: 0.0031 - val_kl:
0.5344 - val_loss: -1.1437 - val_nll: -1.1666
Epoch 737/2000
6/6             4s 630ms/step - kl:
0.5339 - nll: -1.3770 - total_loss: -1.3554 - val_direction: 0.0030 - val_kl:
0.5339 - val_loss: -1.1573 - val_nll: -1.1801
Epoch 738/2000
6/6             4s 654ms/step - kl:
0.5325 - nll: -1.3800 - total_loss: -1.3585 - val_direction: 0.0023 - val_kl:
0.5320 - val_loss: -1.2025 - val_nll: -1.2250
Epoch 739/2000
6/6             4s 690ms/step - kl:
0.5314 - nll: -1.3820 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
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0.5316 - val_loss: -1.1651 - val_nll: -1.1878
Epoch 740/2000
6/6            5s 839ms/step - kl:
0.5311 - nll: -1.3778 - total_loss: -1.3563 - val_direction: 0.0036 - val_kl:
0.5316 - val_loss: -1.1232 - val_nll: -1.1462
Epoch 741/2000
6/6            5s 777ms/step - kl:
0.5309 - nll: -1.3756 - total_loss: -1.3540 - val_direction: 0.0027 - val_kl:
0.5314 - val_loss: -1.1767 - val_nll: -1.1993
Epoch 742/2000
6/6            4s 706ms/step - kl:
0.5308 - nll: -1.3810 - total_loss: -1.3596 - val_direction: 0.0024 - val_kl:
0.5310 - val_loss: -1.1846 - val_nll: -1.2071
Epoch 743/2000
6/6            4s 643ms/step - kl:
0.5299 - nll: -1.3820 - total_loss: -1.3607 - val_direction: 0.0028 - val_kl:
0.5299 - val_loss: -1.1662 - val_nll: -1.1888
Epoch 744/2000
6/6            4s 642ms/step - kl:
0.5293 - nll: -1.3781 - total_loss: -1.3567 - val_direction: 0.0027 - val_kl:
0.5295 - val_loss: -1.1714 - val_nll: -1.1940
Epoch 745/2000
6/6            4s 736ms/step - kl:
0.5288 - nll: -1.3817 - total_loss: -1.3604 - val_direction: 0.0027 - val_kl:
0.5290 - val_loss: -1.1723 - val_nll: -1.1948
Epoch 746/2000
6/6            4s 666ms/step - kl:
0.5281 - nll: -1.3791 - total_loss: -1.3578 - val_direction: 0.0029 - val_kl:
0.5285 - val_loss: -1.1639 - val_nll: -1.1865
Epoch 747/2000
6/6            4s 646ms/step - kl:
0.5279 - nll: -1.3795 - total_loss: -1.3581 - val_direction: 0.0026 - val_kl:
0.5287 - val_loss: -1.1819 - val_nll: -1.2043
Epoch 748/2000
6/6            4s 633ms/step - kl:
0.5285 - nll: -1.3782 - total_loss: -1.3568 - val_direction: 0.0027 - val_kl:
0.5296 - val_loss: -1.1717 - val_nll: -1.1942
Epoch 749/2000
6/6            4s 646ms/step - kl:
0.5296 - nll: -1.3808 - total_loss: -1.3594 - val_direction: 0.0026 - val_kl:
0.5307 - val_loss: -1.1765 - val_nll: -1.1990
Epoch 750/2000
6/6            5s 817ms/step - kl:
0.5303 - nll: -1.3794 - total_loss: -1.3580 - val_direction: 0.0028 - val_kl:
0.5310 - val_loss: -1.1630 - val_nll: -1.1856
Epoch 751/2000
6/6            4s 722ms/step - kl:
0.5304 - nll: -1.3791 - total_loss: -1.3577 - val_direction: 0.0028 - val_kl:
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0.5306 - val_loss: -1.1678 - val_nll: -1.1904
Epoch 752/2000
6/6            4s 744ms/step - kl:
0.5298 - nll: -1.3792 - total_loss: -1.3578 - val_direction: 0.0028 - val_kl:
0.5300 - val_loss: -1.1652 - val_nll: -1.1878
Epoch 753/2000
6/6            4s 649ms/step - kl:
0.5291 - nll: -1.3788 - total_loss: -1.3574 - val_direction: 0.0027 - val_kl:
0.5291 - val_loss: -1.1741 - val_nll: -1.1966
Epoch 754/2000
6/6            4s 646ms/step - kl:
0.5281 - nll: -1.3820 - total_loss: -1.3606 - val_direction: 0.0024 - val_kl:
0.5285 - val_loss: -1.1892 - val_nll: -1.2115
Epoch 755/2000
6/6            4s 643ms/step - kl:
0.5280 - nll: -1.3799 - total_loss: -1.3586 - val_direction: 0.0032 - val_kl:
0.5285 - val_loss: -1.1430 - val_nll: -1.1657
Epoch 756/2000
6/6            4s 635ms/step - kl:
0.5273 - nll: -1.3791 - total_loss: -1.3577 - val_direction: 0.0027 - val_kl:
0.5269 - val_loss: -1.1774 - val_nll: -1.1998
Epoch 757/2000
6/6            4s 630ms/step - kl:
0.5260 - nll: -1.3828 - total_loss: -1.3615 - val_direction: 0.0025 - val_kl:
0.5265 - val_loss: -1.1840 - val_nll: -1.2064
Epoch 758/2000
6/6            4s 633ms/step - kl:
0.5261 - nll: -1.3785 - total_loss: -1.3572 - val_direction: 0.0032 - val_kl:
0.5270 - val_loss: -1.1429 - val_nll: -1.1656
Epoch 759/2000
6/6            4s 636ms/step - kl:
0.5266 - nll: -1.3779 - total_loss: -1.3566 - val_direction: 0.0029 - val_kl:
0.5271 - val_loss: -1.1671 - val_nll: -1.1897
Epoch 760/2000
6/6            4s 767ms/step - kl:
0.5264 - nll: -1.3778 - total_loss: -1.3565 - val_direction: 0.0028 - val_kl:
0.5266 - val_loss: -1.1650 - val_nll: -1.1875
Epoch 761/2000
6/6            5s 811ms/step - kl:
0.5261 - nll: -1.3813 - total_loss: -1.3600 - val_direction: 0.0026 - val_kl:
0.5267 - val_loss: -1.1795 - val_nll: -1.2019
Epoch 762/2000
6/6            4s 715ms/step - kl:
0.5262 - nll: -1.3797 - total_loss: -1.3584 - val_direction: 0.0029 - val_kl:
0.5271 - val_loss: -1.1580 - val_nll: -1.1806
Epoch 763/2000
6/6            4s 721ms/step - kl:
0.5266 - nll: -1.3794 - total_loss: -1.3581 - val_direction: 0.0028 - val_kl:
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0.5276 - val_loss: -1.1679 - val_nll: -1.1904
Epoch 764/2000
6/6            4s 642ms/step - kl:
0.5274 - nll: -1.3792 - total_loss: -1.3578 - val_direction: 0.0025 - val_kl:
0.5283 - val_loss: -1.1817 - val_nll: -1.2041
Epoch 765/2000
6/6            4s 644ms/step - kl:
0.5279 - nll: -1.3806 - total_loss: -1.3592 - val_direction: 0.0028 - val_kl:
0.5284 - val_loss: -1.1693 - val_nll: -1.1918
Epoch 766/2000
6/6            4s 709ms/step - kl:
0.5274 - nll: -1.3802 - total_loss: -1.3589 - val_direction: 0.0029 - val_kl:
0.5274 - val_loss: -1.1633 - val_nll: -1.1858
Epoch 767/2000
6/6            4s 715ms/step - kl:
0.5269 - nll: -1.3777 - total_loss: -1.3564 - val_direction: 0.0028 - val_kl:
0.5271 - val_loss: -1.1655 - val_nll: -1.1880
Epoch 768/2000
6/6            4s 639ms/step - kl:
0.5258 - nll: -1.3800 - total_loss: -1.3587 - val_direction: 0.0027 - val_kl:
0.5258 - val_loss: -1.1715 - val_nll: -1.1939
Epoch 769/2000
6/6            4s 629ms/step - kl:
0.5251 - nll: -1.3779 - total_loss: -1.3567 - val_direction: 0.0028 - val_kl:
0.5250 - val_loss: -1.1649 - val_nll: -1.1873
Epoch 770/2000
6/6            5s 813ms/step - kl:
0.5242 - nll: -1.3822 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.5248 - val_loss: -1.1729 - val_nll: -1.1953
Epoch 771/2000
6/6            5s 811ms/step - kl:
0.5242 - nll: -1.3784 - total_loss: -1.3572 - val_direction: 0.0030 - val_kl:
0.5244 - val_loss: -1.1578 - val_nll: -1.1803
Epoch 772/2000
6/6            4s 674ms/step - kl:
0.5232 - nll: -1.3811 - total_loss: -1.3599 - val_direction: 0.0027 - val_kl:
0.5231 - val_loss: -1.1730 - val_nll: -1.1953
Epoch 773/2000
6/6            4s 651ms/step - kl:
0.5227 - nll: -1.3780 - total_loss: -1.3568 - val_direction: 0.0029 - val_kl:
0.5234 - val_loss: -1.1601 - val_nll: -1.1825
Epoch 774/2000
6/6            4s 661ms/step - kl:
0.5230 - nll: -1.3801 - total_loss: -1.3589 - val_direction: 0.0026 - val_kl:
0.5242 - val_loss: -1.1819 - val_nll: -1.2041
Epoch 775/2000
6/6            4s 667ms/step - kl:
0.5238 - nll: -1.3813 - total_loss: -1.3601 - val_direction: 0.0025 - val_kl:
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0.5251 - val_loss: -1.1839 - val_nll: -1.2062
Epoch 776/2000
6/6            4s 631ms/step - kl:
0.5251 - nll: -1.3804 - total_loss: -1.3592 - val_direction: 0.0030 - val_kl:
0.5257 - val_loss: -1.1521 - val_nll: -1.1747
Epoch 777/2000
6/6            4s 628ms/step - kl:
0.5246 - nll: -1.3781 - total_loss: -1.3568 - val_direction: 0.0028 - val_kl:
0.5245 - val_loss: -1.1708 - val_nll: -1.1932
Epoch 778/2000
6/6            4s 636ms/step - kl:
0.5236 - nll: -1.3797 - total_loss: -1.3586 - val_direction: 0.0026 - val_kl:
0.5238 - val_loss: -1.1805 - val_nll: -1.2027
Epoch 779/2000
6/6            4s 629ms/step - kl:
0.5233 - nll: -1.3822 - total_loss: -1.3611 - val_direction: 0.0026 - val_kl:
0.5239 - val_loss: -1.1821 - val_nll: -1.2043
Epoch 780/2000
6/6            5s 817ms/step - kl:
0.5237 - nll: -1.3779 - total_loss: -1.3567 - val_direction: 0.0031 - val_kl:
0.5247 - val_loss: -1.1466 - val_nll: -1.1692
Epoch 781/2000
6/6            5s 761ms/step - kl:
0.5239 - nll: -1.3776 - total_loss: -1.3564 - val_direction: 0.0029 - val_kl:
0.5240 - val_loss: -1.1626 - val_nll: -1.1850
Epoch 782/2000
6/6            4s 706ms/step - kl:
0.5234 - nll: -1.3786 - total_loss: -1.3574 - val_direction: 0.0027 - val_kl:
0.5235 - val_loss: -1.1726 - val_nll: -1.1949
Epoch 783/2000
6/6            4s 648ms/step - kl:
0.5226 - nll: -1.3827 - total_loss: -1.3616 - val_direction: 0.0025 - val_kl:
0.5231 - val_loss: -1.1879 - val_nll: -1.2101
Epoch 784/2000
6/6            4s 642ms/step - kl:
0.5228 - nll: -1.3802 - total_loss: -1.3591 - val_direction: 0.0028 - val_kl:
0.5235 - val_loss: -1.1655 - val_nll: -1.1879
Epoch 785/2000
6/6            4s 643ms/step - kl:
0.5228 - nll: -1.3791 - total_loss: -1.3580 - val_direction: 0.0027 - val_kl:
0.5232 - val_loss: -1.1811 - val_nll: -1.2033
Epoch 786/2000
6/6            4s 629ms/step - kl:
0.5226 - nll: -1.3818 - total_loss: -1.3607 - val_direction: 0.0024 - val_kl:
0.5228 - val_loss: -1.1909 - val_nll: -1.2130
Epoch 787/2000
6/6            4s 627ms/step - kl:
0.5220 - nll: -1.3823 - total_loss: -1.3612 - val_direction: 0.0028 - val_kl:
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0.5217 - val_loss: -1.1663 - val_nll: -1.1886
Epoch 788/2000
6/6            4s 635ms/step - kl:
0.5204 - nll: -1.3808 - total_loss: -1.3598 - val_direction: 0.0028 - val_kl:
0.5201 - val_loss: -1.1737 - val_nll: -1.1959
Epoch 789/2000
6/6            4s 647ms/step - kl:
0.5195 - nll: -1.3801 - total_loss: -1.3591 - val_direction: 0.0029 - val_kl:
0.5199 - val_loss: -1.1567 - val_nll: -1.1790
Epoch 790/2000
6/6            4s 774ms/step - kl:
0.5191 - nll: -1.3791 - total_loss: -1.3581 - val_direction: 0.0031 - val_kl:
0.5193 - val_loss: -1.1518 - val_nll: -1.1741
Epoch 791/2000
6/6            5s 811ms/step - kl:
0.5185 - nll: -1.3797 - total_loss: -1.3587 - val_direction: 0.0027 - val_kl:
0.5192 - val_loss: -1.1747 - val_nll: -1.1969
Epoch 792/2000
6/6            4s 662ms/step - kl:
0.5189 - nll: -1.3803 - total_loss: -1.3593 - val_direction: 0.0028 - val_kl:
0.5203 - val_loss: -1.1651 - val_nll: -1.1873
Epoch 793/2000
6/6            4s 723ms/step - kl:
0.5199 - nll: -1.3783 - total_loss: -1.3573 - val_direction: 0.0030 - val_kl:
0.5204 - val_loss: -1.1547 - val_nll: -1.1771
Epoch 794/2000
6/6            4s 639ms/step - kl:
0.5197 - nll: -1.3799 - total_loss: -1.3589 - val_direction: 0.0026 - val_kl:
0.5200 - val_loss: -1.1807 - val_nll: -1.2028
Epoch 795/2000
6/6            4s 642ms/step - kl:
0.5195 - nll: -1.3815 - total_loss: -1.3605 - val_direction: 0.0029 - val_kl:
0.5204 - val_loss: -1.1638 - val_nll: -1.1861
Epoch 796/2000
6/6            4s 632ms/step - kl:
0.5200 - nll: -1.3780 - total_loss: -1.3569 - val_direction: 0.0031 - val_kl:
0.5210 - val_loss: -1.1486 - val_nll: -1.1710
Epoch 797/2000
6/6            4s 659ms/step - kl:
0.5204 - nll: -1.3783 - total_loss: -1.3573 - val_direction: 0.0028 - val_kl:
0.5209 - val_loss: -1.1686 - val_nll: -1.1908
Epoch 798/2000
6/6            4s 635ms/step - kl:
0.5203 - nll: -1.3811 - total_loss: -1.3601 - val_direction: 0.0027 - val_kl:
0.5202 - val_loss: -1.1767 - val_nll: -1.1989
Epoch 799/2000
6/6            4s 629ms/step - kl:
0.5197 - nll: -1.3778 - total_loss: -1.3568 - val_direction: 0.0032 - val_kl:
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0.5199 - val_loss: -1.1453 - val_nll: -1.1677
Epoch 800/2000
6/6            4s 741ms/step - kl:
0.5189 - nll: -1.3756 - total_loss: -1.3546 - val_direction: 0.0030 - val_kl:
0.5188 - val_loss: -1.1605 - val_nll: -1.1827
Epoch 801/2000
6/6            5s 803ms/step - kl:
0.5175 - nll: -1.3808 - total_loss: -1.3599 - val_direction: 0.0021 - val_kl:
0.5173 - val_loss: -1.2138 - val_nll: -1.2355
Epoch 802/2000
6/6            4s 656ms/step - kl:
0.5172 - nll: -1.3834 - total_loss: -1.3625 - val_direction: 0.0026 - val_kl:
0.5183 - val_loss: -1.1769 - val_nll: -1.1989
Epoch 803/2000
6/6            4s 692ms/step - kl:
0.5182 - nll: -1.3804 - total_loss: -1.3594 - val_direction: 0.0030 - val_kl:
0.5193 - val_loss: -1.1584 - val_nll: -1.1806
Epoch 804/2000
6/6            4s 664ms/step - kl:
0.5191 - nll: -1.3793 - total_loss: -1.3583 - val_direction: 0.0025 - val_kl:
0.5203 - val_loss: -1.1831 - val_nll: -1.2052
Epoch 805/2000
6/6            4s 644ms/step - kl:
0.5199 - nll: -1.3821 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.5203 - val_loss: -1.1755 - val_nll: -1.1976
Epoch 806/2000
6/6            4s 632ms/step - kl:
0.5196 - nll: -1.3797 - total_loss: -1.3587 - val_direction: 0.0032 - val_kl:
0.5202 - val_loss: -1.1493 - val_nll: -1.1716
Epoch 807/2000
6/6            4s 631ms/step - kl:
0.5192 - nll: -1.3777 - total_loss: -1.3567 - val_direction: 0.0026 - val_kl:
0.5180 - val_loss: -1.1789 - val_nll: -1.2009
Epoch 808/2000
6/6            4s 640ms/step - kl:
0.5163 - nll: -1.3821 - total_loss: -1.3613 - val_direction: 0.0023 - val_kl:
0.5157 - val_loss: -1.1993 - val_nll: -1.2211
Epoch 809/2000
6/6            4s 631ms/step - kl:
0.5151 - nll: -1.3824 - total_loss: -1.3616 - val_direction: 0.0030 - val_kl:
0.5161 - val_loss: -1.1537 - val_nll: -1.1758
Epoch 810/2000
6/6            4s 769ms/step - kl:
0.5156 - nll: -1.3778 - total_loss: -1.3569 - val_direction: 0.0032 - val_kl:
0.5163 - val_loss: -1.1469 - val_nll: -1.1692
Epoch 811/2000
6/6            5s 823ms/step - kl:
0.5155 - nll: -1.3775 - total_loss: -1.3566 - val_direction: 0.0026 - val_kl:
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0.5159 - val_loss: -1.1851 - val_nll: -1.2070
Epoch 812/2000
6/6            4s 723ms/step - kl:
0.5155 - nll: -1.3819 - total_loss: -1.3611 - val_direction: 0.0024 - val_kl:
0.5165 - val_loss: -1.1924 - val_nll: -1.2143
Epoch 813/2000
6/6            4s 643ms/step - kl:
0.5161 - nll: -1.3817 - total_loss: -1.3608 - val_direction: 0.0031 - val_kl:
0.5167 - val_loss: -1.1480 - val_nll: -1.1702
Epoch 814/2000
6/6            4s 642ms/step - kl:
0.5162 - nll: -1.3790 - total_loss: -1.3581 - val_direction: 0.0027 - val_kl:
0.5168 - val_loss: -1.1732 - val_nll: -1.1953
Epoch 815/2000
6/6            4s 644ms/step - kl:
0.5162 - nll: -1.3792 - total_loss: -1.3584 - val_direction: 0.0030 - val_kl:
0.5167 - val_loss: -1.1573 - val_nll: -1.1795
Epoch 816/2000
6/6            4s 631ms/step - kl:
0.5161 - nll: -1.3795 - total_loss: -1.3586 - val_direction: 0.0027 - val_kl:
0.5166 - val_loss: -1.1735 - val_nll: -1.1955
Epoch 817/2000
6/6            4s 631ms/step - kl:
0.5161 - nll: -1.3816 - total_loss: -1.3608 - val_direction: 0.0028 - val_kl:
0.5165 - val_loss: -1.1654 - val_nll: -1.1875
Epoch 818/2000
6/6            4s 640ms/step - kl:
0.5158 - nll: -1.3787 - total_loss: -1.3578 - val_direction: 0.0032 - val_kl:
0.5158 - val_loss: -1.1487 - val_nll: -1.1709
Epoch 819/2000
6/6            4s 644ms/step - kl:
0.5145 - nll: -1.3788 - total_loss: -1.3580 - val_direction: 0.0027 - val_kl:
0.5142 - val_loss: -1.1773 - val_nll: -1.1992
Epoch 820/2000
6/6            5s 827ms/step - kl:
0.5136 - nll: -1.3817 - total_loss: -1.3610 - val_direction: 0.0026 - val_kl:
0.5141 - val_loss: -1.1788 - val_nll: -1.2007
Epoch 821/2000
6/6            5s 809ms/step - kl:
0.5134 - nll: -1.3813 - total_loss: -1.3605 - val_direction: 0.0029 - val_kl:
0.5144 - val_loss: -1.1596 - val_nll: -1.1816
Epoch 822/2000
6/6            4s 680ms/step - kl:
0.5144 - nll: -1.3781 - total_loss: -1.3572 - val_direction: 0.0026 - val_kl:
0.5153 - val_loss: -1.1804 - val_nll: -1.2023
Epoch 823/2000
6/6            4s 646ms/step - kl:
0.5148 - nll: -1.3830 - total_loss: -1.3622 - val_direction: 0.0028 - val_kl:
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0.5161 - val_loss: -1.1697 - val_nll: -1.1918
Epoch 824/2000
6/6            4s 642ms/step - kl:
0.5160 - nll: -1.3780 - total_loss: -1.3571 - val_direction: 0.0032 - val_kl:
0.5169 - val_loss: -1.1475 - val_nll: -1.1698
Epoch 825/2000
6/6            4s 645ms/step - kl:
0.5157 - nll: -1.3779 - total_loss: -1.3570 - val_direction: 0.0025 - val_kl:
0.5151 - val_loss: -1.1858 - val_nll: -1.2077
Epoch 826/2000
6/6            4s 650ms/step - kl:
0.5142 - nll: -1.3826 - total_loss: -1.3619 - val_direction: 0.0023 - val_kl:
0.5141 - val_loss: -1.1947 - val_nll: -1.2164
Epoch 827/2000
6/6            4s 648ms/step - kl:
0.5135 - nll: -1.3821 - total_loss: -1.3613 - val_direction: 0.0028 - val_kl:
0.5140 - val_loss: -1.1660 - val_nll: -1.1880
Epoch 828/2000
6/6            4s 634ms/step - kl:
0.5132 - nll: -1.3788 - total_loss: -1.3581 - val_direction: 0.0031 - val_kl:
0.5136 - val_loss: -1.1537 - val_nll: -1.1758
Epoch 829/2000
6/6            4s 636ms/step - kl:
0.5131 - nll: -1.3793 - total_loss: -1.3585 - val_direction: 0.0028 - val_kl:
0.5135 - val_loss: -1.1680 - val_nll: -1.1899
Epoch 830/2000
6/6            5s 797ms/step - kl:
0.5127 - nll: -1.3804 - total_loss: -1.3597 - val_direction: 0.0025 - val_kl:
0.5127 - val_loss: -1.1860 - val_nll: -1.2077
Epoch 831/2000
6/6            5s 807ms/step - kl:
0.5123 - nll: -1.3805 - total_loss: -1.3598 - val_direction: 0.0027 - val_kl:
0.5134 - val_loss: -1.1742 - val_nll: -1.1961
Epoch 832/2000
6/6            4s 714ms/step - kl:
0.5137 - nll: -1.3801 - total_loss: -1.3593 - val_direction: 0.0028 - val_kl:
0.5156 - val_loss: -1.1683 - val_nll: -1.1903
Epoch 833/2000
6/6            4s 641ms/step - kl:
0.5152 - nll: -1.3803 - total_loss: -1.3595 - val_direction: 0.0026 - val_kl:
0.5155 - val_loss: -1.1814 - val_nll: -1.2033
Epoch 834/2000
6/6            4s 672ms/step - kl:
0.5143 - nll: -1.3802 - total_loss: -1.3594 - val_direction: 0.0028 - val_kl:
0.5137 - val_loss: -1.1674 - val_nll: -1.1894
Epoch 835/2000
6/6            4s 648ms/step - kl:
0.5126 - nll: -1.3800 - total_loss: -1.3593 - val_direction: 0.0028 - val_kl:
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0.5124 - val_loss: -1.1676 - val_nll: -1.1895
Epoch 836/2000
6/6            4s 634ms/step - kl:
0.5118 - nll: -1.3794 - total_loss: -1.3587 - val_direction: 0.0032 - val_kl:
0.5125 - val_loss: -1.1435 - val_nll: -1.1656
Epoch 837/2000
6/6            4s 638ms/step - kl:
0.5120 - nll: -1.3764 - total_loss: -1.3557 - val_direction: 0.0028 - val_kl:
0.5124 - val_loss: -1.1697 - val_nll: -1.1916
Epoch 838/2000
6/6            4s 638ms/step - kl:
0.5117 - nll: -1.3803 - total_loss: -1.3596 - val_direction: 0.0027 - val_kl:
0.5122 - val_loss: -1.1751 - val_nll: -1.1970
Epoch 839/2000
6/6            4s 633ms/step - kl:
0.5118 - nll: -1.3797 - total_loss: -1.3590 - val_direction: 0.0027 - val_kl:
0.5124 - val_loss: -1.1735 - val_nll: -1.1953
Epoch 840/2000
6/6            4s 773ms/step - kl:
0.5117 - nll: -1.3799 - total_loss: -1.3592 - val_direction: 0.0029 - val_kl:
0.5120 - val_loss: -1.1613 - val_nll: -1.1833
Epoch 841/2000
6/6            5s 820ms/step - kl:
0.5117 - nll: -1.3767 - total_loss: -1.3560 - val_direction: 0.0029 - val_kl:
0.5128 - val_loss: -1.1634 - val_nll: -1.1853
Epoch 842/2000
6/6            4s 711ms/step - kl:
0.5128 - nll: -1.3805 - total_loss: -1.3597 - val_direction: 0.0026 - val_kl:
0.5141 - val_loss: -1.1778 - val_nll: -1.1996
Epoch 843/2000
6/6            4s 728ms/step - kl:
0.5134 - nll: -1.3810 - total_loss: -1.3603 - val_direction: 0.0025 - val_kl:
0.5129 - val_loss: -1.1874 - val_nll: -1.2092
Epoch 844/2000
6/6            4s 642ms/step - kl:
0.5115 - nll: -1.3819 - total_loss: -1.3612 - val_direction: 0.0028 - val_kl:
0.5113 - val_loss: -1.1716 - val_nll: -1.1934
Epoch 845/2000
6/6            4s 646ms/step - kl:
0.5109 - nll: -1.3787 - total_loss: -1.3580 - val_direction: 0.0029 - val_kl:
0.5117 - val_loss: -1.1659 - val_nll: -1.1878
Epoch 846/2000
6/6            4s 637ms/step - kl:
0.5110 - nll: -1.3835 - total_loss: -1.3629 - val_direction: 0.0022 - val_kl:
0.5115 - val_loss: -1.2018 - val_nll: -1.2234
Epoch 847/2000
6/6            4s 636ms/step - kl:
0.5109 - nll: -1.3804 - total_loss: -1.3598 - val_direction: 0.0030 - val_kl:
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0.5111 - val_loss: -1.1550 - val_nll: -1.1769
Epoch 848/2000
6/6            4s 630ms/step - kl:
0.5101 - nll: -1.3784 - total_loss: -1.3578 - val_direction: 0.0030 - val_kl:
0.5102 - val_loss: -1.1599 - val_nll: -1.1819
Epoch 849/2000
6/6            4s 656ms/step - kl:
0.5095 - nll: -1.3795 - total_loss: -1.3589 - val_direction: 0.0028 - val_kl:
0.5098 - val_loss: -1.1687 - val_nll: -1.1905
Epoch 850/2000
6/6            4s 638ms/step - kl:
0.5088 - nll: -1.3808 - total_loss: -1.3602 - val_direction: 0.0026 - val_kl:
0.5089 - val_loss: -1.1785 - val_nll: -1.2002
Epoch 851/2000
6/6            5s 832ms/step - kl:
0.5087 - nll: -1.3809 - total_loss: -1.3603 - val_direction: 0.0028 - val_kl:
0.5101 - val_loss: -1.1711 - val_nll: -1.1929
Epoch 852/2000
6/6            5s 768ms/step - kl:
0.5101 - nll: -1.3815 - total_loss: -1.3608 - val_direction: 0.0026 - val_kl:
0.5113 - val_loss: -1.1791 - val_nll: -1.2009
Epoch 853/2000
6/6            4s 723ms/step - kl:
0.5108 - nll: -1.3786 - total_loss: -1.3579 - val_direction: 0.0032 - val_kl:
0.5107 - val_loss: -1.1460 - val_nll: -1.1680
Epoch 854/2000
6/6            4s 642ms/step - kl:
0.5092 - nll: -1.3792 - total_loss: -1.3586 - val_direction: 0.0027 - val_kl:
0.5082 - val_loss: -1.1798 - val_nll: -1.2015
Epoch 855/2000
6/6            4s 645ms/step - kl:
0.5072 - nll: -1.3791 - total_loss: -1.3586 - val_direction: 0.0026 - val_kl:
0.5070 - val_loss: -1.1791 - val_nll: -1.2007
Epoch 856/2000
6/6            4s 664ms/step - kl:
0.5061 - nll: -1.3813 - total_loss: -1.3609 - val_direction: 0.0025 - val_kl:
0.5061 - val_loss: -1.1844 - val_nll: -1.2059
Epoch 857/2000
6/6            4s 729ms/step - kl:
0.5057 - nll: -1.3799 - total_loss: -1.3595 - val_direction: 0.0029 - val_kl:
0.5066 - val_loss: -1.1618 - val_nll: -1.1836
Epoch 858/2000
6/6            4s 706ms/step - kl:
0.5065 - nll: -1.3786 - total_loss: -1.3580 - val_direction: 0.0030 - val_kl:
0.5074 - val_loss: -1.1607 - val_nll: -1.1824
Epoch 859/2000
6/6            4s 633ms/step - kl:
0.5070 - nll: -1.3799 - total_loss: -1.3594 - val_direction: 0.0026 - val_kl:
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0.5079 - val_loss: -1.1788 - val_nll: -1.2005
Epoch 860/2000
6/6             4s 636ms/step - kl:
0.5078 - nll: -1.3800 - total_loss: -1.3595 - val_direction: 0.0027 - val_kl:
0.5090 - val_loss: -1.1698 - val_nll: -1.1915
Epoch 861/2000
6/6             4s 740ms/step - kl:
0.5086 - nll: -1.3811 - total_loss: -1.3605 - val_direction: 0.0027 - val_kl:
0.5091 - val_loss: -1.1758 - val_nll: -1.1975
Epoch 862/2000
6/6             5s 799ms/step - kl:
0.5086 - nll: -1.3798 - total_loss: -1.3592 - val_direction: 0.0031 - val_kl:
0.5092 - val_loss: -1.1521 - val_nll: -1.1740
Epoch 863/2000
6/6             4s 705ms/step - kl:
0.5088 - nll: -1.3759 - total_loss: -1.3552 - val_direction: 0.0029 - val_kl:
0.5099 - val_loss: -1.1634 - val_nll: -1.1852
Epoch 864/2000
6/6             4s 731ms/step - kl:
0.5095 - nll: -1.3795 - total_loss: -1.3589 - val_direction: 0.0024 - val_kl:
0.5099 - val_loss: -1.1903 - val_nll: -1.2120
Epoch 865/2000
6/6             4s 642ms/step - kl:
0.5090 - nll: -1.3829 - total_loss: -1.3624 - val_direction: 0.0027 - val_kl:
0.5090 - val_loss: -1.1734 - val_nll: -1.1951
Epoch 866/2000
6/6             4s 647ms/step - kl:
0.5079 - nll: -1.3798 - total_loss: -1.3592 - val_direction: 0.0030 - val_kl:
0.5079 - val_loss: -1.1573 - val_nll: -1.1791
Epoch 867/2000
6/6             4s 722ms/step - kl:
0.5073 - nll: -1.3791 - total_loss: -1.3586 - val_direction: 0.0028 - val_kl:
0.5078 - val_loss: -1.1734 - val_nll: -1.1951
Epoch 868/2000
6/6             4s 691ms/step - kl:
0.5073 - nll: -1.3818 - total_loss: -1.3614 - val_direction: 0.0024 - val_kl:
0.5072 - val_loss: -1.1913 - val_nll: -1.2128
Epoch 869/2000
6/6             4s 634ms/step - kl:
0.5062 - nll: -1.3800 - total_loss: -1.3595 - val_direction: 0.0031 - val_kl:
0.5063 - val_loss: -1.1481 - val_nll: -1.1699
Epoch 870/2000
6/6             4s 633ms/step - kl:
0.5053 - nll: -1.3798 - total_loss: -1.3594 - val_direction: 0.0028 - val_kl:
0.5056 - val_loss: -1.1715 - val_nll: -1.1932
Epoch 871/2000
6/6             5s 811ms/step - kl:
0.5053 - nll: -1.3807 - total_loss: -1.3603 - val_direction: 0.0029 - val_kl:
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0.5058 - val_loss: -1.1644 - val_nll: -1.1861
Epoch 872/2000
6/6            4s 730ms/step - kl:
0.5052 - nll: -1.3801 - total_loss: -1.3597 - val_direction: 0.0030 - val_kl:
0.5054 - val_loss: -1.1579 - val_nll: -1.1796
Epoch 873/2000
6/6            4s 675ms/step - kl:
0.5047 - nll: -1.3788 - total_loss: -1.3584 - val_direction: 0.0027 - val_kl:
0.5057 - val_loss: -1.1786 - val_nll: -1.2002
Epoch 874/2000
6/6            4s 704ms/step - kl:
0.5060 - nll: -1.3797 - total_loss: -1.3592 - val_direction: 0.0026 - val_kl:
0.5071 - val_loss: -1.1786 - val_nll: -1.2002
Epoch 875/2000
6/6            4s 642ms/step - kl:
0.5070 - nll: -1.3811 - total_loss: -1.3606 - val_direction: 0.0027 - val_kl:
0.5083 - val_loss: -1.1714 - val_nll: -1.1932
Epoch 876/2000
6/6            4s 642ms/step - kl:
0.5075 - nll: -1.3815 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.5070 - val_loss: -1.1739 - val_nll: -1.1955
Epoch 877/2000
6/6            4s 704ms/step - kl:
0.5054 - nll: -1.3798 - total_loss: -1.3593 - val_direction: 0.0029 - val_kl:
0.5047 - val_loss: -1.1640 - val_nll: -1.1856
Epoch 878/2000
6/6            4s 723ms/step - kl:
0.5036 - nll: -1.3785 - total_loss: -1.3581 - val_direction: 0.0026 - val_kl:
0.5034 - val_loss: -1.1792 - val_nll: -1.2006
Epoch 879/2000
6/6            4s 639ms/step - kl:
0.5030 - nll: -1.3796 - total_loss: -1.3593 - val_direction: 0.0030 - val_kl:
0.5040 - val_loss: -1.1554 - val_nll: -1.1771
Epoch 880/2000
6/6            4s 633ms/step - kl:
0.5038 - nll: -1.3790 - total_loss: -1.3586 - val_direction: 0.0026 - val_kl:
0.5045 - val_loss: -1.1811 - val_nll: -1.2026
Epoch 881/2000
6/6            4s 781ms/step - kl:
0.5040 - nll: -1.3825 - total_loss: -1.3621 - val_direction: 0.0025 - val_kl:
0.5046 - val_loss: -1.1856 - val_nll: -1.2070
Epoch 882/2000
6/6            5s 810ms/step - kl:
0.5045 - nll: -1.3793 - total_loss: -1.3588 - val_direction: 0.0035 - val_kl:
0.5053 - val_loss: -1.1273 - val_nll: -1.1492
Epoch 883/2000
6/6            4s 660ms/step - kl:
0.5042 - nll: -1.3770 - total_loss: -1.3565 - val_direction: 0.0024 - val_kl:
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0.5044 - val_loss: -1.1939 - val_nll: -1.2153
Epoch 884/2000
6/6            4s 713ms/step - kl:
0.5046 - nll: -1.3834 - total_loss: -1.3629 - val_direction: 0.0024 - val_kl:
0.5064 - val_loss: -1.1916 - val_nll: -1.2130
Epoch 885/2000
6/6            4s 658ms/step - kl:
0.5060 - nll: -1.3812 - total_loss: -1.3608 - val_direction: 0.0030 - val_kl:
0.5061 - val_loss: -1.1601 - val_nll: -1.1818
Epoch 886/2000
6/6            4s 656ms/step - kl:
0.5050 - nll: -1.3805 - total_loss: -1.3601 - val_direction: 0.0028 - val_kl:
0.5046 - val_loss: -1.1689 - val_nll: -1.1905
Epoch 887/2000
6/6            4s 635ms/step - kl:
0.5041 - nll: -1.3795 - total_loss: -1.3591 - val_direction: 0.0029 - val_kl:
0.5044 - val_loss: -1.1628 - val_nll: -1.1844
Epoch 888/2000
6/6            4s 637ms/step - kl:
0.5036 - nll: -1.3803 - total_loss: -1.3600 - val_direction: 0.0026 - val_kl:
0.5042 - val_loss: -1.1806 - val_nll: -1.2020
Epoch 889/2000
6/6            4s 631ms/step - kl:
0.5036 - nll: -1.3799 - total_loss: -1.3595 - val_direction: 0.0030 - val_kl:
0.5040 - val_loss: -1.1579 - val_nll: -1.1796
Epoch 890/2000
6/6            4s 632ms/step - kl:
0.5029 - nll: -1.3785 - total_loss: -1.3582 - val_direction: 0.0028 - val_kl:
0.5024 - val_loss: -1.1694 - val_nll: -1.1909
Epoch 891/2000
6/6            4s 634ms/step - kl:
0.5013 - nll: -1.3806 - total_loss: -1.3604 - val_direction: 0.0025 - val_kl:
0.5012 - val_loss: -1.1849 - val_nll: -1.2062
Epoch 892/2000
6/6            5s 840ms/step - kl:
0.5006 - nll: -1.3811 - total_loss: -1.3609 - val_direction: 0.0027 - val_kl:
0.5015 - val_loss: -1.1780 - val_nll: -1.1993
Epoch 893/2000
6/6            5s 829ms/step - kl:
0.5013 - nll: -1.3797 - total_loss: -1.3594 - val_direction: 0.0028 - val_kl:
0.5023 - val_loss: -1.1685 - val_nll: -1.1901
Epoch 894/2000
6/6            4s 724ms/step - kl:
0.5021 - nll: -1.3818 - total_loss: -1.3616 - val_direction: 0.0026 - val_kl:
0.5029 - val_loss: -1.1793 - val_nll: -1.2007
Epoch 895/2000
6/6            4s 645ms/step - kl:
0.5027 - nll: -1.3801 - total_loss: -1.3598 - val_direction: 0.0029 - val_kl:
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0.5035 - val_loss: -1.1649 - val_nll: -1.1865
Epoch 896/2000
6/6            4s 644ms/step - kl:
0.5030 - nll: -1.3795 - total_loss: -1.3592 - val_direction: 0.0029 - val_kl:
0.5029 - val_loss: -1.1615 - val_nll: -1.1831
Epoch 897/2000
6/6            4s 641ms/step - kl:
0.5019 - nll: -1.3802 - total_loss: -1.3599 - val_direction: 0.0030 - val_kl:
0.5020 - val_loss: -1.1569 - val_nll: -1.1785
Epoch 898/2000
6/6            4s 631ms/step - kl:
0.5014 - nll: -1.3784 - total_loss: -1.3581 - val_direction: 0.0029 - val_kl:
0.5018 - val_loss: -1.1638 - val_nll: -1.1853
Epoch 899/2000
6/6            4s 637ms/step - kl:
0.5013 - nll: -1.3798 - total_loss: -1.3595 - val_direction: 0.0025 - val_kl:
0.5018 - val_loss: -1.1875 - val_nll: -1.2088
Epoch 900/2000
6/6            4s 646ms/step - kl:
0.5018 - nll: -1.3810 - total_loss: -1.3607 - val_direction: 0.0028 - val_kl:
0.5030 - val_loss: -1.1652 - val_nll: -1.1867
Epoch 901/2000
6/6            4s 717ms/step - kl:
0.5028 - nll: -1.3779 - total_loss: -1.3575 - val_direction: 0.0031 - val_kl:
0.5038 - val_loss: -1.1556 - val_nll: -1.1773
Epoch 902/2000
6/6            5s 749ms/step - kl:
0.5035 - nll: -1.3780 - total_loss: -1.3575 - val_direction: 0.0026 - val_kl:
0.5047 - val_loss: -1.1835 - val_nll: -1.2050
Epoch 903/2000
6/6            4s 772ms/step - kl:
0.5043 - nll: -1.3831 - total_loss: -1.3627 - val_direction: 0.0022 - val_kl:
0.5043 - val_loss: -1.2034 - val_nll: -1.2247
Epoch 904/2000
6/6            4s 687ms/step - kl:
0.5034 - nll: -1.3817 - total_loss: -1.3614 - val_direction: 0.0031 - val_kl:
0.5035 - val_loss: -1.1494 - val_nll: -1.1711
Epoch 905/2000
6/6            4s 680ms/step - kl:
0.5026 - nll: -1.3774 - total_loss: -1.3570 - val_direction: 0.0029 - val_kl:
0.5029 - val_loss: -1.1642 - val_nll: -1.1858
Epoch 906/2000
6/6            4s 645ms/step - kl:
0.5020 - nll: -1.3808 - total_loss: -1.3605 - val_direction: 0.0025 - val_kl:
0.5019 - val_loss: -1.1868 - val_nll: -1.2082
Epoch 907/2000
6/6            4s 646ms/step - kl:
0.5010 - nll: -1.3788 - total_loss: -1.3585 - val_direction: 0.0032 - val_kl:
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0.5009 - val_loss: -1.1442 - val_nll: -1.1658
Epoch 908/2000
6/6            4s 687ms/step - kl:
0.4998 - nll: -1.3800 - total_loss: -1.3598 - val_direction: 0.0024 - val_kl:
0.4991 - val_loss: -1.1983 - val_nll: -1.2194
Epoch 909/2000
6/6            4s 637ms/step - kl:
0.4981 - nll: -1.3810 - total_loss: -1.3609 - val_direction: 0.0025 - val_kl:
0.4985 - val_loss: -1.1828 - val_nll: -1.2040
Epoch 910/2000
6/6            4s 634ms/step - kl:
0.4982 - nll: -1.3805 - total_loss: -1.3603 - val_direction: 0.0030 - val_kl:
0.4988 - val_loss: -1.1592 - val_nll: -1.1807
Epoch 911/2000
6/6            4s 701ms/step - kl:
0.4982 - nll: -1.3772 - total_loss: -1.3571 - val_direction: 0.0029 - val_kl:
0.4985 - val_loss: -1.1635 - val_nll: -1.1848
Epoch 912/2000
6/6            4s 674ms/step - kl:
0.4975 - nll: -1.3792 - total_loss: -1.3591 - val_direction: 0.0025 - val_kl:
0.4977 - val_loss: -1.1907 - val_nll: -1.2118
Epoch 913/2000
6/6            4s 737ms/step - kl:
0.4979 - nll: -1.3814 - total_loss: -1.3612 - val_direction: 0.0027 - val_kl:
0.4996 - val_loss: -1.1754 - val_nll: -1.1968
Epoch 914/2000
6/6            4s 647ms/step - kl:
0.4995 - nll: -1.3813 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.5006 - val_loss: -1.1765 - val_nll: -1.1979
Epoch 915/2000
6/6            4s 660ms/step - kl:
0.5005 - nll: -1.3806 - total_loss: -1.3603 - val_direction: 0.0030 - val_kl:
0.5012 - val_loss: -1.1610 - val_nll: -1.1825
Epoch 916/2000
6/6            4s 656ms/step - kl:
0.5003 - nll: -1.3795 - total_loss: -1.3593 - val_direction: 0.0028 - val_kl:
0.5003 - val_loss: -1.1716 - val_nll: -1.1930
Epoch 917/2000
6/6            4s 641ms/step - kl:
0.4999 - nll: -1.3817 - total_loss: -1.3614 - val_direction: 0.0025 - val_kl:
0.5006 - val_loss: -1.1875 - val_nll: -1.2087
Epoch 918/2000
6/6            4s 627ms/step - kl:
0.5004 - nll: -1.3815 - total_loss: -1.3613 - val_direction: 0.0029 - val_kl:
0.5012 - val_loss: -1.1649 - val_nll: -1.1864
Epoch 919/2000
6/6            4s 634ms/step - kl:
0.5002 - nll: -1.3788 - total_loss: -1.3585 - val_direction: 0.0031 - val_kl:
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0.4997 - val_loss: -1.1559 - val_nll: -1.1774
Epoch 920/2000
6/6             4s 635ms/step - kl:
0.4988 - nll: -1.3806 - total_loss: -1.3605 - val_direction: 0.0024 - val_kl:
0.4988 - val_loss: -1.1927 - val_nll: -1.2139
Epoch 921/2000
6/6             4s 773ms/step - kl:
0.4980 - nll: -1.3815 - total_loss: -1.3614 - val_direction: 0.0026 - val_kl:
0.4979 - val_loss: -1.1811 - val_nll: -1.2023
Epoch 922/2000
6/6             4s 713ms/step - kl:
0.4973 - nll: -1.3807 - total_loss: -1.3606 - val_direction: 0.0029 - val_kl:
0.4982 - val_loss: -1.1653 - val_nll: -1.1866
Epoch 923/2000
6/6             4s 774ms/step - kl:
0.4977 - nll: -1.3805 - total_loss: -1.3603 - val_direction: 0.0028 - val_kl:
0.4982 - val_loss: -1.1674 - val_nll: -1.1888
Epoch 924/2000
6/6             4s 643ms/step - kl:
0.4976 - nll: -1.3795 - total_loss: -1.3594 - val_direction: 0.0026 - val_kl:
0.4977 - val_loss: -1.1796 - val_nll: -1.2008
Epoch 925/2000
6/6             4s 642ms/step - kl:
0.4969 - nll: -1.3815 - total_loss: -1.3614 - val_direction: 0.0028 - val_kl:
0.4970 - val_loss: -1.1737 - val_nll: -1.1950
Epoch 926/2000
6/6             4s 644ms/step - kl:
0.4960 - nll: -1.3782 - total_loss: -1.3581 - val_direction: 0.0031 - val_kl:
0.4954 - val_loss: -1.1525 - val_nll: -1.1739
Epoch 927/2000
6/6             4s 630ms/step - kl:
0.4936 - nll: -1.3777 - total_loss: -1.3578 - val_direction: 0.0027 - val_kl:
0.4927 - val_loss: -1.1744 - val_nll: -1.1954
Epoch 928/2000
6/6             4s 638ms/step - kl:
0.4923 - nll: -1.3811 - total_loss: -1.3612 - val_direction: 0.0023 - val_kl:
0.4935 - val_loss: -1.1988 - val_nll: -1.2197
Epoch 929/2000
6/6             4s 634ms/step - kl:
0.4940 - nll: -1.3834 - total_loss: -1.3634 - val_direction: 0.0026 - val_kl:
0.4964 - val_loss: -1.1834 - val_nll: -1.2045
Epoch 930/2000
6/6             4s 643ms/step - kl:
0.4969 - nll: -1.3804 - total_loss: -1.3603 - val_direction: 0.0029 - val_kl:
0.4984 - val_loss: -1.1621 - val_nll: -1.1835
Epoch 931/2000
6/6             5s 827ms/step - kl:
0.4981 - nll: -1.3768 - total_loss: -1.3566 - val_direction: 0.0032 - val_kl:
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0.4986 - val_loss: -1.1460 - val_nll: -1.1675
Epoch 932/2000
6/6             4s 648ms/step - kl:
0.4972 - nll: -1.3809 - total_loss: -1.3608 - val_direction: 0.0025 - val_kl:
0.4965 - val_loss: -1.1873 - val_nll: -1.2084
Epoch 933/2000
6/6             4s 719ms/step - kl:
0.4955 - nll: -1.3794 - total_loss: -1.3594 - val_direction: 0.0028 - val_kl:
0.4954 - val_loss: -1.1637 - val_nll: -1.1850
Epoch 934/2000
6/6             4s 646ms/step - kl:
0.4949 - nll: -1.3786 - total_loss: -1.3586 - val_direction: 0.0030 - val_kl:
0.4961 - val_loss: -1.1587 - val_nll: -1.1801
Epoch 935/2000
6/6             4s 641ms/step - kl:
0.4965 - nll: -1.3802 - total_loss: -1.3601 - val_direction: 0.0027 - val_kl:
0.4979 - val_loss: -1.1780 - val_nll: -1.1992
Epoch 936/2000
6/6             4s 640ms/step - kl:
0.4977 - nll: -1.3807 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
0.4979 - val_loss: -1.1734 - val_nll: -1.1947
Epoch 937/2000
6/6             4s 632ms/step - kl:
0.4974 - nll: -1.3807 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
0.4977 - val_loss: -1.1703 - val_nll: -1.1916
Epoch 938/2000
6/6             4s 648ms/step - kl:
0.4968 - nll: -1.3775 - total_loss: -1.3574 - val_direction: 0.0029 - val_kl:
0.4969 - val_loss: -1.1650 - val_nll: -1.1864
Epoch 939/2000
6/6             4s 642ms/step - kl:
0.4964 - nll: -1.3795 - total_loss: -1.3594 - val_direction: 0.0024 - val_kl:
0.4969 - val_loss: -1.1927 - val_nll: -1.2138
Epoch 940/2000
6/6             4s 631ms/step - kl:
0.4964 - nll: -1.3811 - total_loss: -1.3610 - val_direction: 0.0026 - val_kl:
0.4969 - val_loss: -1.1794 - val_nll: -1.2006
Epoch 941/2000
6/6             5s 801ms/step - kl:
0.4964 - nll: -1.3835 - total_loss: -1.3635 - val_direction: 0.0027 - val_kl:
0.4967 - val_loss: -1.1753 - val_nll: -1.1965
Epoch 942/2000
6/6             4s 645ms/step - kl:
0.4960 - nll: -1.3814 - total_loss: -1.3614 - val_direction: 0.0032 - val_kl:
0.4955 - val_loss: -1.1420 - val_nll: -1.1634
Epoch 943/2000
6/6             4s 720ms/step - kl:
0.4938 - nll: -1.3761 - total_loss: -1.3561 - val_direction: 0.0028 - val_kl:
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0.4927 - val_loss: -1.1714 - val_nll: -1.1925
Epoch 944/2000
6/6            4s 645ms/step - kl:
0.4918 - nll: -1.3825 - total_loss: -1.3626 - val_direction: 0.0022 - val_kl:
0.4921 - val_loss: -1.2029 - val_nll: -1.2237
Epoch 945/2000
6/6            4s 650ms/step - kl:
0.4921 - nll: -1.3830 - total_loss: -1.3631 - val_direction: 0.0030 - val_kl:
0.4938 - val_loss: -1.1564 - val_nll: -1.1777
Epoch 946/2000
6/6            4s 657ms/step - kl:
0.4938 - nll: -1.3781 - total_loss: -1.3580 - val_direction: 0.0029 - val_kl:
0.4946 - val_loss: -1.1640 - val_nll: -1.1852
Epoch 947/2000
6/6            4s 633ms/step - kl:
0.4936 - nll: -1.3793 - total_loss: -1.3593 - val_direction: 0.0025 - val_kl:
0.4934 - val_loss: -1.1863 - val_nll: -1.2073
Epoch 948/2000
6/6            4s 634ms/step - kl:
0.4927 - nll: -1.3831 - total_loss: -1.3632 - val_direction: 0.0028 - val_kl:
0.4932 - val_loss: -1.1713 - val_nll: -1.1924
Epoch 949/2000
6/6            4s 642ms/step - kl:
0.4934 - nll: -1.3788 - total_loss: -1.3588 - val_direction: 0.0034 - val_kl:
0.4948 - val_loss: -1.1372 - val_nll: -1.1587
Epoch 950/2000
6/6            4s 774ms/step - kl:
0.4941 - nll: -1.3793 - total_loss: -1.3593 - val_direction: 0.0026 - val_kl:
0.4944 - val_loss: -1.1838 - val_nll: -1.2048
Epoch 951/2000
6/6            4s 668ms/step - kl:
0.4939 - nll: -1.3813 - total_loss: -1.3613 - val_direction: 0.0023 - val_kl:
0.4942 - val_loss: -1.1942 - val_nll: -1.2151
Epoch 952/2000
6/6            4s 670ms/step - kl:
0.4934 - nll: -1.3819 - total_loss: -1.3619 - val_direction: 0.0030 - val_kl:
0.4931 - val_loss: -1.1617 - val_nll: -1.1829
Epoch 953/2000
6/6            4s 673ms/step - kl:
0.4925 - nll: -1.3765 - total_loss: -1.3565 - val_direction: 0.0029 - val_kl:
0.4935 - val_loss: -1.1638 - val_nll: -1.1850
Epoch 954/2000
6/6            4s 645ms/step - kl:
0.4936 - nll: -1.3795 - total_loss: -1.3595 - val_direction: 0.0027 - val_kl:
0.4944 - val_loss: -1.1729 - val_nll: -1.1941
Epoch 955/2000
6/6            4s 640ms/step - kl:
0.4934 - nll: -1.3790 - total_loss: -1.3591 - val_direction: 0.0025 - val_kl:
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0.4929 - val_loss: -1.1855 - val_nll: -1.2065
Epoch 956/2000
6/6            4s 633ms/step - kl:
0.4921 - nll: -1.3831 - total_loss: -1.3633 - val_direction: 0.0024 - val_kl:
0.4917 - val_loss: -1.1894 - val_nll: -1.2103
Epoch 957/2000
6/6            4s 642ms/step - kl:
0.4911 - nll: -1.3821 - total_loss: -1.3623 - val_direction: 0.0030 - val_kl:
0.4921 - val_loss: -1.1541 - val_nll: -1.1753
Epoch 958/2000
6/6            4s 630ms/step - kl:
0.4918 - nll: -1.3795 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
0.4920 - val_loss: -1.1608 - val_nll: -1.1820
Epoch 959/2000
6/6            4s 631ms/step - kl:
0.4915 - nll: -1.3788 - total_loss: -1.3589 - val_direction: 0.0025 - val_kl:
0.4918 - val_loss: -1.1834 - val_nll: -1.2043
Epoch 960/2000
6/6            4s 740ms/step - kl:
0.4913 - nll: -1.3822 - total_loss: -1.3623 - val_direction: 0.0028 - val_kl:
0.4921 - val_loss: -1.1698 - val_nll: -1.1909
Epoch 961/2000
6/6            4s 680ms/step - kl:
0.4922 - nll: -1.3802 - total_loss: -1.3603 - val_direction: 0.0028 - val_kl:
0.4928 - val_loss: -1.1685 - val_nll: -1.1896
Epoch 962/2000
6/6            4s 729ms/step - kl:
0.4916 - nll: -1.3815 - total_loss: -1.3617 - val_direction: 0.0025 - val_kl:
0.4911 - val_loss: -1.1884 - val_nll: -1.2093
Epoch 963/2000
6/6            4s 647ms/step - kl:
0.4910 - nll: -1.3817 - total_loss: -1.3619 - val_direction: 0.0029 - val_kl:
0.4923 - val_loss: -1.1641 - val_nll: -1.1853
Epoch 964/2000
6/6            4s 640ms/step - kl:
0.4922 - nll: -1.3793 - total_loss: -1.3594 - val_direction: 0.0032 - val_kl:
0.4927 - val_loss: -1.1493 - val_nll: -1.1705
Epoch 965/2000
6/6            4s 641ms/step - kl:
0.4920 - nll: -1.3794 - total_loss: -1.3595 - val_direction: 0.0027 - val_kl:
0.4916 - val_loss: -1.1738 - val_nll: -1.1948
Epoch 966/2000
6/6            4s 636ms/step - kl:
0.4905 - nll: -1.3826 - total_loss: -1.3629 - val_direction: 0.0026 - val_kl:
0.4901 - val_loss: -1.1772 - val_nll: -1.1981
Epoch 967/2000
6/6            4s 630ms/step - kl:
0.4892 - nll: -1.3798 - total_loss: -1.3600 - val_direction: 0.0027 - val_kl:
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0.4892 - val_loss: -1.1817 - val_nll: -1.2026
Epoch 968/2000
6/6            4s 636ms/step - kl:
0.4890 - nll: -1.3806 - total_loss: -1.3608 - val_direction: 0.0026 - val_kl:
0.4899 - val_loss: -1.1829 - val_nll: -1.2038
Epoch 969/2000
6/6            4s 658ms/step - kl:
0.4893 - nll: -1.3804 - total_loss: -1.3606 - val_direction: 0.0030 - val_kl:
0.4896 - val_loss: -1.1566 - val_nll: -1.1777
Epoch 970/2000
6/6            4s 732ms/step - kl:
0.4893 - nll: -1.3778 - total_loss: -1.3580 - val_direction: 0.0027 - val_kl:
0.4899 - val_loss: -1.1777 - val_nll: -1.1986
Epoch 971/2000
6/6            4s 646ms/step - kl:
0.4898 - nll: -1.3817 - total_loss: -1.3618 - val_direction: 0.0027 - val_kl:
0.4913 - val_loss: -1.1729 - val_nll: -1.1939
Epoch 972/2000
6/6            4s 725ms/step - kl:
0.4913 - nll: -1.3784 - total_loss: -1.3585 - val_direction: 0.0032 - val_kl:
0.4918 - val_loss: -1.1476 - val_nll: -1.1689
Epoch 973/2000
6/6            4s 642ms/step - kl:
0.4899 - nll: -1.3794 - total_loss: -1.3597 - val_direction: 0.0025 - val_kl:
0.4882 - val_loss: -1.1920 - val_nll: -1.2127
Epoch 974/2000
6/6            4s 645ms/step - kl:
0.4869 - nll: -1.3823 - total_loss: -1.3627 - val_direction: 0.0023 - val_kl:
0.4860 - val_loss: -1.1942 - val_nll: -1.2148
Epoch 975/2000
6/6            4s 641ms/step - kl:
0.4854 - nll: -1.3811 - total_loss: -1.3615 - val_direction: 0.0028 - val_kl:
0.4860 - val_loss: -1.1732 - val_nll: -1.1940
Epoch 976/2000
6/6            4s 653ms/step - kl:
0.4861 - nll: -1.3797 - total_loss: -1.3600 - val_direction: 0.0026 - val_kl:
0.4877 - val_loss: -1.1820 - val_nll: -1.2028
Epoch 977/2000
6/6            4s 644ms/step - kl:
0.4887 - nll: -1.3800 - total_loss: -1.3601 - val_direction: 0.0026 - val_kl:
0.4915 - val_loss: -1.1783 - val_nll: -1.1993
Epoch 978/2000
6/6            4s 636ms/step - kl:
0.4917 - nll: -1.3808 - total_loss: -1.3609 - val_direction: 0.0029 - val_kl:
0.4925 - val_loss: -1.1676 - val_nll: -1.1887
Epoch 979/2000
6/6            4s 641ms/step - kl:
0.4915 - nll: -1.3800 - total_loss: -1.3601 - val_direction: 0.0029 - val_kl:
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0.4907 - val_loss: -1.1610 - val_nll: -1.1820
Epoch 980/2000
6/6            5s 789ms/step - kl:
0.4891 - nll: -1.3797 - total_loss: -1.3600 - val_direction: 0.0028 - val_kl:
0.4876 - val_loss: -1.1707 - val_nll: -1.1916
Epoch 981/2000
6/6            4s 677ms/step - kl:
0.4868 - nll: -1.3793 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
0.4874 - val_loss: -1.1597 - val_nll: -1.1806
Epoch 982/2000
6/6            4s 719ms/step - kl:
0.4873 - nll: -1.3796 - total_loss: -1.3598 - val_direction: 0.0027 - val_kl:
0.4884 - val_loss: -1.1804 - val_nll: -1.2013
Epoch 983/2000
6/6            4s 643ms/step - kl:
0.4882 - nll: -1.3805 - total_loss: -1.3607 - val_direction: 0.0029 - val_kl:
0.4886 - val_loss: -1.1651 - val_nll: -1.1861
Epoch 984/2000
6/6            4s 662ms/step - kl:
0.4879 - nll: -1.3788 - total_loss: -1.3591 - val_direction: 0.0029 - val_kl:
0.4878 - val_loss: -1.1669 - val_nll: -1.1879
Epoch 985/2000
6/6            4s 651ms/step - kl:
0.4878 - nll: -1.3809 - total_loss: -1.3611 - val_direction: 0.0027 - val_kl:
0.4891 - val_loss: -1.1744 - val_nll: -1.1954
Epoch 986/2000
6/6            4s 668ms/step - kl:
0.4885 - nll: -1.3796 - total_loss: -1.3599 - val_direction: 0.0028 - val_kl:
0.4886 - val_loss: -1.1659 - val_nll: -1.1869
Epoch 987/2000
6/6            4s 715ms/step - kl:
0.4881 - nll: -1.3823 - total_loss: -1.3626 - val_direction: 0.0026 - val_kl:
0.4883 - val_loss: -1.1858 - val_nll: -1.2066
Epoch 988/2000
6/6            4s 631ms/step - kl:
0.4876 - nll: -1.3791 - total_loss: -1.3594 - val_direction: 0.0030 - val_kl:
0.4872 - val_loss: -1.1592 - val_nll: -1.1802
Epoch 989/2000
6/6            4s 664ms/step - kl:
0.4857 - nll: -1.3796 - total_loss: -1.3599 - val_direction: 0.0026 - val_kl:
0.4850 - val_loss: -1.1866 - val_nll: -1.2072
Epoch 990/2000
6/6            5s 776ms/step - kl:
0.4844 - nll: -1.3829 - total_loss: -1.3633 - val_direction: 0.0022 - val_kl:
0.4854 - val_loss: -1.2025 - val_nll: -1.2231
Epoch 991/2000
6/6            4s 675ms/step - kl:
0.4859 - nll: -1.3835 - total_loss: -1.3638 - val_direction: 0.0029 - val_kl:
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0.4877 - val_loss: -1.1670 - val_nll: -1.1879
Epoch 992/2000
6/6            4s 717ms/step - kl:
0.4879 - nll: -1.3780 - total_loss: -1.3582 - val_direction: 0.0031 - val_kl:
0.4890 - val_loss: -1.1516 - val_nll: -1.1727
Epoch 993/2000
6/6            4s 640ms/step - kl:
0.4882 - nll: -1.3784 - total_loss: -1.3586 - val_direction: 0.0027 - val_kl:
0.4875 - val_loss: -1.1728 - val_nll: -1.1937
Epoch 994/2000
6/6            4s 644ms/step - kl:
0.4864 - nll: -1.3813 - total_loss: -1.3617 - val_direction: 0.0028 - val_kl:
0.4864 - val_loss: -1.1696 - val_nll: -1.1905
Epoch 995/2000
6/6            4s 639ms/step - kl:
0.4862 - nll: -1.3793 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
0.4870 - val_loss: -1.1614 - val_nll: -1.1824
Epoch 996/2000
6/6            4s 629ms/step - kl:
0.4870 - nll: -1.3801 - total_loss: -1.3603 - val_direction: 0.0024 - val_kl:
0.4884 - val_loss: -1.1902 - val_nll: -1.2109
Epoch 997/2000
6/6            4s 631ms/step - kl:
0.4885 - nll: -1.3833 - total_loss: -1.3636 - val_direction: 0.0024 - val_kl:
0.4894 - val_loss: -1.1949 - val_nll: -1.2157
Epoch 998/2000
6/6            4s 639ms/step - kl:
0.4885 - nll: -1.3816 - total_loss: -1.3619 - val_direction: 0.0029 - val_kl:
0.4880 - val_loss: -1.1616 - val_nll: -1.1826
Epoch 999/2000
6/6            4s 751ms/step - kl:
0.4866 - nll: -1.3791 - total_loss: -1.3595 - val_direction: 0.0029 - val_kl:
0.4857 - val_loss: -1.1643 - val_nll: -1.1852
Epoch 1000/2000
6/6            5s 823ms/step - kl:
0.4850 - nll: -1.3796 - total_loss: -1.3600 - val_direction: 0.0026 - val_kl:
0.4854 - val_loss: -1.1808 - val_nll: -1.2015
Epoch 1001/2000
6/6            4s 692ms/step - kl:
0.4852 - nll: -1.3810 - total_loss: -1.3614 - val_direction: 0.0029 - val_kl:
0.4861 - val_loss: -1.1669 - val_nll: -1.1878
Epoch 1002/2000
6/6            4s 642ms/step - kl:
0.4858 - nll: -1.3798 - total_loss: -1.3602 - val_direction: 0.0027 - val_kl:
0.4862 - val_loss: -1.1783 - val_nll: -1.1990
Epoch 1003/2000
6/6            4s 645ms/step - kl:
0.4853 - nll: -1.3813 - total_loss: -1.3617 - val_direction: 0.0027 - val_kl:
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0.4851 - val_loss: -1.1770 - val_nll: -1.1977
Epoch 1004/2000
6/6            4s 640ms/step - kl:
0.4844 - nll: -1.3791 - total_loss: -1.3595 - val_direction: 0.0028 - val_kl:
0.4847 - val_loss: -1.1679 - val_nll: -1.1887
Epoch 1005/2000
6/6            4s 634ms/step - kl:
0.4843 - nll: -1.3804 - total_loss: -1.3608 - val_direction: 0.0029 - val_kl:
0.4851 - val_loss: -1.1665 - val_nll: -1.1873
Epoch 1006/2000
6/6            4s 647ms/step - kl:
0.4853 - nll: -1.3819 - total_loss: -1.3623 - val_direction: 0.0031 - val_kl:
0.4873 - val_loss: -1.1507 - val_nll: -1.1717
Epoch 1007/2000
6/6            4s 638ms/step - kl:
0.4872 - nll: -1.3770 - total_loss: -1.3572 - val_direction: 0.0034 - val_kl:
0.4876 - val_loss: -1.1310 - val_nll: -1.1522
Epoch 1008/2000
6/6            4s 635ms/step - kl:
0.4863 - nll: -1.3786 - total_loss: -1.3590 - val_direction: 0.0027 - val_kl:
0.4849 - val_loss: -1.1769 - val_nll: -1.1976
Epoch 1009/2000
6/6            5s 801ms/step - kl:
0.4832 - nll: -1.3827 - total_loss: -1.3632 - val_direction: 0.0024 - val_kl:
0.4828 - val_loss: -1.1948 - val_nll: -1.2153
Epoch 1010/2000
6/6            4s 706ms/step - kl:
0.4826 - nll: -1.3813 - total_loss: -1.3617 - val_direction: 0.0031 - val_kl:
0.4839 - val_loss: -1.1546 - val_nll: -1.1755
Epoch 1011/2000
6/6            4s 722ms/step - kl:
0.4838 - nll: -1.3795 - total_loss: -1.3599 - val_direction: 0.0024 - val_kl:
0.4844 - val_loss: -1.1954 - val_nll: -1.2159
Epoch 1012/2000
6/6            4s 640ms/step - kl:
0.4841 - nll: -1.3825 - total_loss: -1.3630 - val_direction: 0.0025 - val_kl:
0.4847 - val_loss: -1.1866 - val_nll: -1.2073
Epoch 1013/2000
6/6            4s 653ms/step - kl:
0.4843 - nll: -1.3810 - total_loss: -1.3615 - val_direction: 0.0029 - val_kl:
0.4847 - val_loss: -1.1650 - val_nll: -1.1859
Epoch 1014/2000
6/6            4s 655ms/step - kl:
0.4839 - nll: -1.3777 - total_loss: -1.3581 - val_direction: 0.0029 - val_kl:
0.4837 - val_loss: -1.1636 - val_nll: -1.1844
Epoch 1015/2000
6/6            4s 634ms/step - kl:
0.4834 - nll: -1.3813 - total_loss: -1.3618 - val_direction: 0.0025 - val_kl:
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0.4840 - val_loss: -1.1821 - val_nll: -1.2027
Epoch 1016/2000
6/6             4s 632ms/step - kl:
0.4832 - nll: -1.3805 - total_loss: -1.3609 - val_direction: 0.0028 - val_kl:
0.4826 - val_loss: -1.1702 - val_nll: -1.1909
Epoch 1017/2000
6/6             4s 635ms/step - kl:
0.4812 - nll: -1.3802 - total_loss: -1.3607 - val_direction: 0.0027 - val_kl:
0.4802 - val_loss: -1.1760 - val_nll: -1.1966
Epoch 1018/2000
6/6             4s 774ms/step - kl:
0.4798 - nll: -1.3807 - total_loss: -1.3613 - val_direction: 0.0024 - val_kl:
0.4805 - val_loss: -1.1921 - val_nll: -1.2125
Epoch 1019/2000
6/6             5s 790ms/step - kl:
0.4804 - nll: -1.3812 - total_loss: -1.3617 - val_direction: 0.0028 - val_kl:
0.4817 - val_loss: -1.1715 - val_nll: -1.1922
Epoch 1020/2000
6/6             4s 670ms/step - kl:
0.4819 - nll: -1.3841 - total_loss: -1.3646 - val_direction: 0.0027 - val_kl:
0.4838 - val_loss: -1.1756 - val_nll: -1.1963
Epoch 1021/2000
6/6             4s 678ms/step - kl:
0.4838 - nll: -1.3804 - total_loss: -1.3608 - val_direction: 0.0030 - val_kl:
0.4845 - val_loss: -1.1560 - val_nll: -1.1769
Epoch 1022/2000
6/6             4s 646ms/step - kl:
0.4834 - nll: -1.3801 - total_loss: -1.3606 - val_direction: 0.0029 - val_kl:
0.4827 - val_loss: -1.1664 - val_nll: -1.1871
Epoch 1023/2000
6/6             4s 647ms/step - kl:
0.4820 - nll: -1.3807 - total_loss: -1.3612 - val_direction: 0.0029 - val_kl:
0.4821 - val_loss: -1.1659 - val_nll: -1.1866
Epoch 1024/2000
6/6             4s 632ms/step - kl:
0.4814 - nll: -1.3791 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
0.4817 - val_loss: -1.1565 - val_nll: -1.1772
Epoch 1025/2000
6/6             4s 632ms/step - kl:
0.4808 - nll: -1.3797 - total_loss: -1.3602 - val_direction: 0.0024 - val_kl:
0.4808 - val_loss: -1.1961 - val_nll: -1.2165
Epoch 1026/2000
6/6             4s 634ms/step - kl:
0.4801 - nll: -1.3816 - total_loss: -1.3622 - val_direction: 0.0026 - val_kl:
0.4801 - val_loss: -1.1841 - val_nll: -1.2046
Epoch 1027/2000
6/6             4s 636ms/step - kl:
0.4796 - nll: -1.3826 - total_loss: -1.3633 - val_direction: 0.0028 - val_kl:
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0.4797 - val_loss: -1.1718 - val_nll: -1.1924
Epoch 1028/2000
6/6            5s 819ms/step - kl:
0.4791 - nll: -1.3782 - total_loss: -1.3588 - val_direction: 0.0028 - val_kl:
0.4789 - val_loss: -1.1708 - val_nll: -1.1913
Epoch 1029/2000
6/6            5s 746ms/step - kl:
0.4775 - nll: -1.3806 - total_loss: -1.3613 - val_direction: 0.0024 - val_kl:
0.4767 - val_loss: -1.1953 - val_nll: -1.2156
Epoch 1030/2000
6/6            4s 718ms/step - kl:
0.4764 - nll: -1.3824 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4775 - val_loss: -1.1769 - val_nll: -1.1973
Epoch 1031/2000
6/6            4s 640ms/step - kl:
0.4780 - nll: -1.3801 - total_loss: -1.3607 - val_direction: 0.0030 - val_kl:
0.4796 - val_loss: -1.1561 - val_nll: -1.1768
Epoch 1032/2000
6/6            4s 645ms/step - kl:
0.4790 - nll: -1.3788 - total_loss: -1.3594 - val_direction: 0.0029 - val_kl:
0.4786 - val_loss: -1.1641 - val_nll: -1.1847
Epoch 1033/2000
6/6            4s 640ms/step - kl:
0.4778 - nll: -1.3802 - total_loss: -1.3609 - val_direction: 0.0025 - val_kl:
0.4782 - val_loss: -1.1882 - val_nll: -1.2085
Epoch 1034/2000
6/6            4s 632ms/step - kl:
0.4780 - nll: -1.3822 - total_loss: -1.3629 - val_direction: 0.0031 - val_kl:
0.4798 - val_loss: -1.1482 - val_nll: -1.1689
Epoch 1035/2000
6/6            4s 636ms/step - kl:
0.4801 - nll: -1.3791 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
0.4811 - val_loss: -1.1616 - val_nll: -1.1823
Epoch 1036/2000
6/6            4s 651ms/step - kl:
0.4808 - nll: -1.3806 - total_loss: -1.3611 - val_direction: 0.0024 - val_kl:
0.4817 - val_loss: -1.1949 - val_nll: -1.2154
Epoch 1037/2000
6/6            4s 650ms/step - kl:
0.4820 - nll: -1.3817 - total_loss: -1.3622 - val_direction: 0.0028 - val_kl:
0.4827 - val_loss: -1.1730 - val_nll: -1.1937
Epoch 1038/2000
6/6            5s 825ms/step - kl:
0.4821 - nll: -1.3813 - total_loss: -1.3618 - val_direction: 0.0029 - val_kl:
0.4819 - val_loss: -1.1609 - val_nll: -1.1816
Epoch 1039/2000
6/6            4s 644ms/step - kl:
0.4810 - nll: -1.3797 - total_loss: -1.3602 - val_direction: 0.0028 - val_kl:
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0.4811 - val_loss: -1.1709 - val_nll: -1.1915
Epoch 1040/2000
6/6            4s 693ms/step - kl:
0.4802 - nll: -1.3812 - total_loss: -1.3618 - val_direction: 0.0026 - val_kl:
0.4798 - val_loss: -1.1797 - val_nll: -1.2002
Epoch 1041/2000
6/6            4s 642ms/step - kl:
0.4794 - nll: -1.3809 - total_loss: -1.3615 - val_direction: 0.0032 - val_kl:
0.4799 - val_loss: -1.1446 - val_nll: -1.1654
Epoch 1042/2000
6/6            4s 645ms/step - kl:
0.4791 - nll: -1.3777 - total_loss: -1.3583 - val_direction: 0.0028 - val_kl:
0.4785 - val_loss: -1.1726 - val_nll: -1.1931
Epoch 1043/2000
6/6            4s 647ms/step - kl:
0.4772 - nll: -1.3827 - total_loss: -1.3634 - val_direction: 0.0021 - val_kl:
0.4764 - val_loss: -1.2120 - val_nll: -1.2322
Epoch 1044/2000
6/6            4s 654ms/step - kl:
0.4758 - nll: -1.3811 - total_loss: -1.3619 - val_direction: 0.0031 - val_kl:
0.4768 - val_loss: -1.1522 - val_nll: -1.1729
Epoch 1045/2000
6/6            4s 633ms/step - kl:
0.4766 - nll: -1.3816 - total_loss: -1.3623 - val_direction: 0.0025 - val_kl:
0.4776 - val_loss: -1.1911 - val_nll: -1.2114
Epoch 1046/2000
6/6            4s 643ms/step - kl:
0.4771 - nll: -1.3820 - total_loss: -1.3627 - val_direction: 0.0028 - val_kl:
0.4780 - val_loss: -1.1695 - val_nll: -1.1900
Epoch 1047/2000
6/6            4s 638ms/step - kl:
0.4781 - nll: -1.3798 - total_loss: -1.3605 - val_direction: 0.0032 - val_kl:
0.4791 - val_loss: -1.1499 - val_nll: -1.1707
Epoch 1048/2000
6/6            5s 827ms/step - kl:
0.4789 - nll: -1.3799 - total_loss: -1.3605 - val_direction: 0.0027 - val_kl:
0.4794 - val_loss: -1.1783 - val_nll: -1.1988
Epoch 1049/2000
6/6            4s 645ms/step - kl:
0.4789 - nll: -1.3800 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
0.4789 - val_loss: -1.1709 - val_nll: -1.1915
Epoch 1050/2000
6/6            4s 729ms/step - kl:
0.4775 - nll: -1.3806 - total_loss: -1.3613 - val_direction: 0.0031 - val_kl:
0.4771 - val_loss: -1.1551 - val_nll: -1.1757
Epoch 1051/2000
6/6            4s 673ms/step - kl:
0.4771 - nll: -1.3790 - total_loss: -1.3596 - val_direction: 0.0030 - val_kl:
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0.4785 - val_loss: -1.1550 - val_nll: -1.1757
Epoch 1052/2000
6/6            4s 649ms/step - kl:
0.4784 - nll: -1.3801 - total_loss: -1.3607 - val_direction: 0.0027 - val_kl:
0.4792 - val_loss: -1.1780 - val_nll: -1.1985
Epoch 1053/2000
6/6            4s 663ms/step - kl:
0.4788 - nll: -1.3794 - total_loss: -1.3600 - val_direction: 0.0029 - val_kl:
0.4792 - val_loss: -1.1635 - val_nll: -1.1841
Epoch 1054/2000
6/6            4s 663ms/step - kl:
0.4785 - nll: -1.3795 - total_loss: -1.3602 - val_direction: 0.0028 - val_kl:
0.4782 - val_loss: -1.1725 - val_nll: -1.1930
Epoch 1055/2000
6/6            4s 712ms/step - kl:
0.4772 - nll: -1.3806 - total_loss: -1.3613 - val_direction: 0.0027 - val_kl:
0.4767 - val_loss: -1.1780 - val_nll: -1.1984
Epoch 1056/2000
6/6            4s 637ms/step - kl:
0.4758 - nll: -1.3828 - total_loss: -1.3636 - val_direction: 0.0028 - val_kl:
0.4764 - val_loss: -1.1676 - val_nll: -1.1881
Epoch 1057/2000
6/6            5s 803ms/step - kl:
0.4770 - nll: -1.3799 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
0.4789 - val_loss: -1.1704 - val_nll: -1.1909
Epoch 1058/2000
6/6            5s 836ms/step - kl:
0.4792 - nll: -1.3817 - total_loss: -1.3623 - val_direction: 0.0030 - val_kl:
0.4805 - val_loss: -1.1603 - val_nll: -1.1810
Epoch 1059/2000
6/6            4s 676ms/step - kl:
0.4798 - nll: -1.3810 - total_loss: -1.3616 - val_direction: 0.0027 - val_kl:
0.4794 - val_loss: -1.1710 - val_nll: -1.1915
Epoch 1060/2000
6/6            4s 657ms/step - kl:
0.4782 - nll: -1.3802 - total_loss: -1.3609 - val_direction: 0.0028 - val_kl:
0.4775 - val_loss: -1.1677 - val_nll: -1.1882
Epoch 1061/2000
6/6            4s 644ms/step - kl:
0.4765 - nll: -1.3799 - total_loss: -1.3606 - val_direction: 0.0028 - val_kl:
0.4760 - val_loss: -1.1749 - val_nll: -1.1954
Epoch 1062/2000
6/6            4s 647ms/step - kl:
0.4753 - nll: -1.3808 - total_loss: -1.3615 - val_direction: 0.0027 - val_kl:
0.4755 - val_loss: -1.1736 - val_nll: -1.1940
Epoch 1063/2000
6/6            4s 631ms/step - kl:
0.4746 - nll: -1.3799 - total_loss: -1.3607 - val_direction: 0.0026 - val_kl:
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0.4749 - val_loss: -1.1852 - val_nll: -1.2055
Epoch 1064/2000
6/6             4s 638ms/step - kl:
0.4747 - nll: -1.3811 - total_loss: -1.3619 - val_direction: 0.0026 - val_kl:
0.4755 - val_loss: -1.1799 - val_nll: -1.2002
Epoch 1065/2000
6/6             4s 630ms/step - kl:
0.4749 - nll: -1.3805 - total_loss: -1.3613 - val_direction: 0.0030 - val_kl:
0.4750 - val_loss: -1.1630 - val_nll: -1.1835
Epoch 1066/2000
6/6             4s 658ms/step - kl:
0.4742 - nll: -1.3794 - total_loss: -1.3602 - val_direction: 0.0026 - val_kl:
0.4739 - val_loss: -1.1831 - val_nll: -1.2034
Epoch 1067/2000
6/6             5s 781ms/step - kl:
0.4731 - nll: -1.3827 - total_loss: -1.3636 - val_direction: 0.0023 - val_kl:
0.4734 - val_loss: -1.2011 - val_nll: -1.2212
Epoch 1068/2000
6/6             4s 708ms/step - kl:
0.4731 - nll: -1.3826 - total_loss: -1.3634 - val_direction: 0.0030 - val_kl:
0.4740 - val_loss: -1.1621 - val_nll: -1.1825
Epoch 1069/2000
6/6             4s 725ms/step - kl:
0.4740 - nll: -1.3799 - total_loss: -1.3606 - val_direction: 0.0032 - val_kl:
0.4752 - val_loss: -1.1495 - val_nll: -1.1701
Epoch 1070/2000
6/6             4s 637ms/step - kl:
0.4749 - nll: -1.3791 - total_loss: -1.3599 - val_direction: 0.0025 - val_kl:
0.4756 - val_loss: -1.1923 - val_nll: -1.2126
Epoch 1071/2000
6/6             4s 645ms/step - kl:
0.4752 - nll: -1.3832 - total_loss: -1.3640 - val_direction: 0.0022 - val_kl:
0.4755 - val_loss: -1.2033 - val_nll: -1.2234
Epoch 1072/2000
6/6             4s 647ms/step - kl:
0.4746 - nll: -1.3820 - total_loss: -1.3629 - val_direction: 0.0033 - val_kl:
0.4740 - val_loss: -1.1394 - val_nll: -1.1600
Epoch 1073/2000
6/6             4s 649ms/step - kl:
0.4724 - nll: -1.3767 - total_loss: -1.3575 - val_direction: 0.0032 - val_kl:
0.4710 - val_loss: -1.1475 - val_nll: -1.1679
Epoch 1074/2000
6/6             4s 648ms/step - kl:
0.4691 - nll: -1.3800 - total_loss: -1.3611 - val_direction: 0.0024 - val_kl:
0.4688 - val_loss: -1.1942 - val_nll: -1.2141
Epoch 1075/2000
6/6             4s 631ms/step - kl:
0.4700 - nll: -1.3831 - total_loss: -1.3640 - val_direction: 0.0023 - val_kl:
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0.4726 - val_loss: -1.1976 - val_nll: -1.2177
Epoch 1076/2000
6/6             4s 633ms/step - kl:
0.4735 - nll: -1.3828 - total_loss: -1.3636 - val_direction: 0.0030 - val_kl:
0.4766 - val_loss: -1.1629 - val_nll: -1.1835
Epoch 1077/2000
6/6             5s 827ms/step - kl:
0.4773 - nll: -1.3783 - total_loss: -1.3589 - val_direction: 0.0030 - val_kl:
0.4785 - val_loss: -1.1588 - val_nll: -1.1794
Epoch 1078/2000
6/6             5s 768ms/step - kl:
0.4774 - nll: -1.3787 - total_loss: -1.3594 - val_direction: 0.0028 - val_kl:
0.4764 - val_loss: -1.1676 - val_nll: -1.1881
Epoch 1079/2000
6/6             4s 716ms/step - kl:
0.4743 - nll: -1.3836 - total_loss: -1.3645 - val_direction: 0.0020 - val_kl:
0.4720 - val_loss: -1.2187 - val_nll: -1.2386
Epoch 1080/2000
6/6             4s 645ms/step - kl:
0.4706 - nll: -1.3835 - total_loss: -1.3645 - val_direction: 0.0028 - val_kl:
0.4711 - val_loss: -1.1704 - val_nll: -1.1906
Epoch 1081/2000
6/6             4s 656ms/step - kl:
0.4714 - nll: -1.3803 - total_loss: -1.3612 - val_direction: 0.0031 - val_kl:
0.4729 - val_loss: -1.1495 - val_nll: -1.1700
Epoch 1082/2000
6/6             4s 640ms/step - kl:
0.4721 - nll: -1.3774 - total_loss: -1.3583 - val_direction: 0.0029 - val_kl:
0.4718 - val_loss: -1.1675 - val_nll: -1.1879
Epoch 1083/2000
6/6             4s 635ms/step - kl:
0.4710 - nll: -1.3811 - total_loss: -1.3621 - val_direction: 0.0024 - val_kl:
0.4705 - val_loss: -1.1951 - val_nll: -1.2152
Epoch 1084/2000
6/6             4s 632ms/step - kl:
0.4697 - nll: -1.3829 - total_loss: -1.3639 - val_direction: 0.0026 - val_kl:
0.4699 - val_loss: -1.1824 - val_nll: -1.2025
Epoch 1085/2000
6/6             4s 629ms/step - kl:
0.4704 - nll: -1.3808 - total_loss: -1.3617 - val_direction: 0.0029 - val_kl:
0.4724 - val_loss: -1.1698 - val_nll: -1.1901
Epoch 1086/2000
6/6             4s 632ms/step - kl:
0.4722 - nll: -1.3787 - total_loss: -1.3596 - val_direction: 0.0029 - val_kl:
0.4726 - val_loss: -1.1621 - val_nll: -1.1824
Epoch 1087/2000
6/6             4s 767ms/step - kl:
0.4716 - nll: -1.3799 - total_loss: -1.3609 - val_direction: 0.0025 - val_kl:
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0.4715 - val_loss: -1.1887 - val_nll: -1.2089
Epoch 1088/2000
6/6             5s 743ms/step - kl:
0.4710 - nll: -1.3817 - total_loss: -1.3626 - val_direction: 0.0027 - val_kl:
0.4711 - val_loss: -1.1743 - val_nll: -1.1945
Epoch 1089/2000
6/6             4s 723ms/step - kl:
0.4706 - nll: -1.3807 - total_loss: -1.3617 - val_direction: 0.0028 - val_kl:
0.4715 - val_loss: -1.1739 - val_nll: -1.1941
Epoch 1090/2000
6/6             4s 641ms/step - kl:
0.4713 - nll: -1.3800 - total_loss: -1.3610 - val_direction: 0.0029 - val_kl:
0.4724 - val_loss: -1.1677 - val_nll: -1.1880
Epoch 1091/2000
6/6             4s 647ms/step - kl:
0.4727 - nll: -1.3811 - total_loss: -1.3620 - val_direction: 0.0028 - val_kl:
0.4735 - val_loss: -1.1682 - val_nll: -1.1885
Epoch 1092/2000
6/6             4s 644ms/step - kl:
0.4729 - nll: -1.3802 - total_loss: -1.3611 - val_direction: 0.0026 - val_kl:
0.4724 - val_loss: -1.1818 - val_nll: -1.2020
Epoch 1093/2000
6/6             4s 672ms/step - kl:
0.4710 - nll: -1.3828 - total_loss: -1.3638 - val_direction: 0.0025 - val_kl:
0.4702 - val_loss: -1.1876 - val_nll: -1.2077
Epoch 1094/2000
6/6             4s 706ms/step - kl:
0.4695 - nll: -1.3814 - total_loss: -1.3625 - val_direction: 0.0030 - val_kl:
0.4699 - val_loss: -1.1588 - val_nll: -1.1791
Epoch 1095/2000
6/6             4s 637ms/step - kl:
0.4697 - nll: -1.3779 - total_loss: -1.3588 - val_direction: 0.0031 - val_kl:
0.4709 - val_loss: -1.1550 - val_nll: -1.1754
Epoch 1096/2000
6/6             4s 656ms/step - kl:
0.4707 - nll: -1.3803 - total_loss: -1.3612 - val_direction: 0.0028 - val_kl:
0.4715 - val_loss: -1.1725 - val_nll: -1.1928
Epoch 1097/2000
6/6             5s 832ms/step - kl:
0.4717 - nll: -1.3777 - total_loss: -1.3586 - val_direction: 0.0030 - val_kl:
0.4731 - val_loss: -1.1590 - val_nll: -1.1795
Epoch 1098/2000
6/6             4s 677ms/step - kl:
0.4723 - nll: -1.3807 - total_loss: -1.3616 - val_direction: 0.0025 - val_kl:
0.4722 - val_loss: -1.1908 - val_nll: -1.2110
Epoch 1099/2000
6/6             4s 718ms/step - kl:
0.4718 - nll: -1.3825 - total_loss: -1.3634 - val_direction: 0.0027 - val_kl:
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0.4724 - val_loss: -1.1768 - val_nll: -1.1970
Epoch 1100/2000
6/6             4s 641ms/step - kl:
0.4723 - nll: -1.3816 - total_loss: -1.3625 - val_direction: 0.0030 - val_kl:
0.4736 - val_loss: -1.1574 - val_nll: -1.1778
Epoch 1101/2000
6/6             4s 638ms/step - kl:
0.4730 - nll: -1.3808 - total_loss: -1.3617 - val_direction: 0.0026 - val_kl:
0.4725 - val_loss: -1.1822 - val_nll: -1.2024
Epoch 1102/2000
6/6             4s 673ms/step - kl:
0.4718 - nll: -1.3822 - total_loss: -1.3632 - val_direction: 0.0029 - val_kl:
0.4721 - val_loss: -1.1633 - val_nll: -1.1837
Epoch 1103/2000
6/6             4s 654ms/step - kl:
0.4713 - nll: -1.3801 - total_loss: -1.3610 - val_direction: 0.0028 - val_kl:
0.4710 - val_loss: -1.1694 - val_nll: -1.1896
Epoch 1104/2000
6/6             4s 694ms/step - kl:
0.4695 - nll: -1.3820 - total_loss: -1.3631 - val_direction: 0.0023 - val_kl:
0.4681 - val_loss: -1.2020 - val_nll: -1.2219
Epoch 1105/2000
6/6             4s 633ms/step - kl:
0.4672 - nll: -1.3824 - total_loss: -1.3635 - val_direction: 0.0027 - val_kl:
0.4675 - val_loss: -1.1728 - val_nll: -1.1928
Epoch 1106/2000
6/6             4s 636ms/step - kl:
0.4674 - nll: -1.3796 - total_loss: -1.3607 - val_direction: 0.0033 - val_kl:
0.4684 - val_loss: -1.1468 - val_nll: -1.1671
Epoch 1107/2000
6/6             4s 740ms/step - kl:
0.4676 - nll: -1.3773 - total_loss: -1.3583 - val_direction: 0.0030 - val_kl:
0.4673 - val_loss: -1.1618 - val_nll: -1.1820
Epoch 1108/2000
6/6             5s 804ms/step - kl:
0.4667 - nll: -1.3810 - total_loss: -1.3622 - val_direction: 0.0024 - val_kl:
0.4673 - val_loss: -1.1923 - val_nll: -1.2122
Epoch 1109/2000
6/6             5s 808ms/step - kl:
0.4675 - nll: -1.3806 - total_loss: -1.3616 - val_direction: 0.0028 - val_kl:
0.4699 - val_loss: -1.1662 - val_nll: -1.1864
Epoch 1110/2000
6/6             4s 713ms/step - kl:
0.4702 - nll: -1.3804 - total_loss: -1.3614 - val_direction: 0.0027 - val_kl:
0.4714 - val_loss: -1.1786 - val_nll: -1.1989
Epoch 1111/2000
6/6             4s 652ms/step - kl:
0.4712 - nll: -1.3831 - total_loss: -1.3641 - val_direction: 0.0024 - val_kl:
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0.4714 - val_loss: -1.1929 - val_nll: -1.2129
Epoch 1112/2000
6/6             4s 651ms/step - kl:
0.4705 - nll: -1.3806 - total_loss: -1.3616 - val_direction: 0.0033 - val_kl:
0.4702 - val_loss: -1.1431 - val_nll: -1.1636
Epoch 1113/2000
6/6             4s 637ms/step - kl:
0.4699 - nll: -1.3760 - total_loss: -1.3569 - val_direction: 0.0029 - val_kl:
0.4702 - val_loss: -1.1705 - val_nll: -1.1908
Epoch 1114/2000
6/6             4s 692ms/step - kl:
0.4685 - nll: -1.3811 - total_loss: -1.3622 - val_direction: 0.0023 - val_kl:
0.4675 - val_loss: -1.1986 - val_nll: -1.2184
Epoch 1115/2000
6/6             4s 685ms/step - kl:
0.4674 - nll: -1.3819 - total_loss: -1.3630 - val_direction: 0.0029 - val_kl:
0.4684 - val_loss: -1.1611 - val_nll: -1.1813
Epoch 1116/2000
6/6             4s 645ms/step - kl:
0.4684 - nll: -1.3799 - total_loss: -1.3609 - val_direction: 0.0027 - val_kl:
0.4695 - val_loss: -1.1787 - val_nll: -1.1989
Epoch 1117/2000
6/6             4s 646ms/step - kl:
0.4692 - nll: -1.3817 - total_loss: -1.3627 - val_direction: 0.0028 - val_kl:
0.4701 - val_loss: -1.1675 - val_nll: -1.1877
Epoch 1118/2000
6/6             4s 648ms/step - kl:
0.4699 - nll: -1.3814 - total_loss: -1.3624 - val_direction: 0.0029 - val_kl:
0.4706 - val_loss: -1.1676 - val_nll: -1.1879
Epoch 1119/2000
6/6             4s 714ms/step - kl:
0.4695 - nll: -1.3800 - total_loss: -1.3610 - val_direction: 0.0026 - val_kl:
0.4693 - val_loss: -1.1818 - val_nll: -1.2019
Epoch 1120/2000
6/6             5s 828ms/step - kl:
0.4687 - nll: -1.3821 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4693 - val_loss: -1.1761 - val_nll: -1.1962
Epoch 1121/2000
6/6             5s 754ms/step - kl:
0.4694 - nll: -1.3794 - total_loss: -1.3603 - val_direction: 0.0031 - val_kl:
0.4703 - val_loss: -1.1557 - val_nll: -1.1760
Epoch 1122/2000
6/6             4s 721ms/step - kl:
0.4695 - nll: -1.3814 - total_loss: -1.3624 - val_direction: 0.0026 - val_kl:
0.4690 - val_loss: -1.1830 - val_nll: -1.2031
Epoch 1123/2000
6/6             4s 643ms/step - kl:
0.4679 - nll: -1.3805 - total_loss: -1.3617 - val_direction: 0.0028 - val_kl:
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0.4667 - val_loss: -1.1683 - val_nll: -1.1884
Epoch 1124/2000
6/6             4s 645ms/step - kl:
0.4658 - nll: -1.3806 - total_loss: -1.3617 - val_direction: 0.0025 - val_kl:
0.4662 - val_loss: -1.1869 - val_nll: -1.2068
Epoch 1125/2000
6/6             4s 664ms/step - kl:
0.4662 - nll: -1.3812 - total_loss: -1.3623 - val_direction: 0.0029 - val_kl:
0.4677 - val_loss: -1.1646 - val_nll: -1.1848
Epoch 1126/2000
6/6             4s 636ms/step - kl:
0.4681 - nll: -1.3798 - total_loss: -1.3608 - val_direction: 0.0029 - val_kl:
0.4691 - val_loss: -1.1679 - val_nll: -1.1881
Epoch 1127/2000
6/6             4s 632ms/step - kl:
0.4681 - nll: -1.3814 - total_loss: -1.3625 - val_direction: 0.0025 - val_kl:
0.4675 - val_loss: -1.1902 - val_nll: -1.2101
Epoch 1128/2000
6/6             4s 639ms/step - kl:
0.4665 - nll: -1.3825 - total_loss: -1.3637 - val_direction: 0.0027 - val_kl:
0.4658 - val_loss: -1.1779 - val_nll: -1.1979
Epoch 1129/2000
6/6             4s 673ms/step - kl:
0.4650 - nll: -1.3802 - total_loss: -1.3614 - val_direction: 0.0027 - val_kl:
0.4653 - val_loss: -1.1797 - val_nll: -1.1997
Epoch 1130/2000
6/6             5s 811ms/step - kl:
0.4652 - nll: -1.3789 - total_loss: -1.3601 - val_direction: 0.0030 - val_kl:
0.4661 - val_loss: -1.1599 - val_nll: -1.1801
Epoch 1131/2000
6/6             5s 767ms/step - kl:
0.4657 - nll: -1.3788 - total_loss: -1.3599 - val_direction: 0.0027 - val_kl:
0.4664 - val_loss: -1.1778 - val_nll: -1.1978
Epoch 1132/2000
6/6             4s 734ms/step - kl:
0.4663 - nll: -1.3819 - total_loss: -1.3631 - val_direction: 0.0026 - val_kl:
0.4673 - val_loss: -1.1852 - val_nll: -1.2052
Epoch 1133/2000
6/6             4s 653ms/step - kl:
0.4674 - nll: -1.3828 - total_loss: -1.3639 - val_direction: 0.0028 - val_kl:
0.4680 - val_loss: -1.1689 - val_nll: -1.1890
Epoch 1134/2000
6/6             4s 644ms/step - kl:
0.4670 - nll: -1.3802 - total_loss: -1.3614 - val_direction: 0.0028 - val_kl:
0.4662 - val_loss: -1.1668 - val_nll: -1.1869
Epoch 1135/2000
6/6             4s 644ms/step - kl:
0.4647 - nll: -1.3800 - total_loss: -1.3612 - val_direction: 0.0026 - val_kl:
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0.4639 - val_loss: -1.1857 - val_nll: -1.2056
Epoch 1136/2000
6/6             4s 639ms/step - kl:
0.4633 - nll: -1.3820 - total_loss: -1.3632 - val_direction: 0.0027 - val_kl:
0.4640 - val_loss: -1.1804 - val_nll: -1.2003
Epoch 1137/2000
6/6             4s 639ms/step - kl:
0.4644 - nll: -1.3827 - total_loss: -1.3639 - val_direction: 0.0028 - val_kl:
0.4654 - val_loss: -1.1741 - val_nll: -1.1941
Epoch 1138/2000
6/6             4s 631ms/step - kl:
0.4652 - nll: -1.3804 - total_loss: -1.3616 - val_direction: 0.0025 - val_kl:
0.4654 - val_loss: -1.1891 - val_nll: -1.2089
Epoch 1139/2000
6/6             4s 635ms/step - kl:
0.4647 - nll: -1.3808 - total_loss: -1.3620 - val_direction: 0.0028 - val_kl:
0.4646 - val_loss: -1.1712 - val_nll: -1.1912
Epoch 1140/2000
6/6             5s 824ms/step - kl:
0.4637 - nll: -1.3814 - total_loss: -1.3627 - val_direction: 0.0027 - val_kl:
0.4625 - val_loss: -1.1806 - val_nll: -1.2004
Epoch 1141/2000
6/6             5s 823ms/step - kl:
0.4614 - nll: -1.3807 - total_loss: -1.3620 - val_direction: 0.0030 - val_kl:
0.4619 - val_loss: -1.1570 - val_nll: -1.1770
Epoch 1142/2000
6/6             4s 684ms/step - kl:
0.4621 - nll: -1.3777 - total_loss: -1.3589 - val_direction: 0.0031 - val_kl:
0.4632 - val_loss: -1.1528 - val_nll: -1.1728
Epoch 1143/2000
6/6             4s 714ms/step - kl:
0.4623 - nll: -1.3822 - total_loss: -1.3636 - val_direction: 0.0025 - val_kl:
0.4621 - val_loss: -1.1909 - val_nll: -1.2107
Epoch 1144/2000
6/6             4s 645ms/step - kl:
0.4619 - nll: -1.3833 - total_loss: -1.3646 - val_direction: 0.0025 - val_kl:
0.4629 - val_loss: -1.1868 - val_nll: -1.2066
Epoch 1145/2000
6/6             4s 646ms/step - kl:
0.4627 - nll: -1.3826 - total_loss: -1.3639 - val_direction: 0.0029 - val_kl:
0.4630 - val_loss: -1.1716 - val_nll: -1.1915
Epoch 1146/2000
6/6             4s 634ms/step - kl:
0.4626 - nll: -1.3800 - total_loss: -1.3613 - val_direction: 0.0030 - val_kl:
0.4635 - val_loss: -1.1579 - val_nll: -1.1779
Epoch 1147/2000
6/6             4s 649ms/step - kl:
0.4633 - nll: -1.3795 - total_loss: -1.3607 - val_direction: 0.0026 - val_kl:
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0.4637 - val_loss: -1.1865 - val_nll: -1.2063
Epoch 1148/2000
6/6             4s 636ms/step - kl:
0.4635 - nll: -1.3831 - total_loss: -1.3643 - val_direction: 0.0025 - val_kl:
0.4643 - val_loss: -1.1885 - val_nll: -1.2083
Epoch 1149/2000
6/6             4s 637ms/step - kl:
0.4646 - nll: -1.3817 - total_loss: -1.3629 - val_direction: 0.0032 - val_kl:
0.4665 - val_loss: -1.1487 - val_nll: -1.1690
Epoch 1150/2000
6/6             4s 755ms/step - kl:
0.4663 - nll: -1.3788 - total_loss: -1.3599 - val_direction: 0.0028 - val_kl:
0.4665 - val_loss: -1.1743 - val_nll: -1.1943
Epoch 1151/2000
6/6             5s 823ms/step - kl:
0.4654 - nll: -1.3805 - total_loss: -1.3618 - val_direction: 0.0029 - val_kl:
0.4642 - val_loss: -1.1657 - val_nll: -1.1857
Epoch 1152/2000
6/6             4s 699ms/step - kl:
0.4631 - nll: -1.3794 - total_loss: -1.3607 - val_direction: 0.0029 - val_kl:
0.4624 - val_loss: -1.1685 - val_nll: -1.1884
Epoch 1153/2000
6/6             4s 735ms/step - kl:
0.4620 - nll: -1.3815 - total_loss: -1.3628 - val_direction: 0.0025 - val_kl:
0.4623 - val_loss: -1.1881 - val_nll: -1.2078
Epoch 1154/2000
6/6             4s 661ms/step - kl:
0.4618 - nll: -1.3810 - total_loss: -1.3623 - val_direction: 0.0028 - val_kl:
0.4621 - val_loss: -1.1728 - val_nll: -1.1926
Epoch 1155/2000
6/6             4s 660ms/step - kl:
0.4614 - nll: -1.3816 - total_loss: -1.3630 - val_direction: 0.0024 - val_kl:
0.4611 - val_loss: -1.1972 - val_nll: -1.2168
Epoch 1156/2000
6/6             4s 631ms/step - kl:
0.4612 - nll: -1.3832 - total_loss: -1.3645 - val_direction: 0.0024 - val_kl:
0.4628 - val_loss: -1.1946 - val_nll: -1.2143
Epoch 1157/2000
6/6             4s 630ms/step - kl:
0.4635 - nll: -1.3821 - total_loss: -1.3633 - val_direction: 0.0029 - val_kl:
0.4652 - val_loss: -1.1620 - val_nll: -1.1821
Epoch 1158/2000
6/6             4s 633ms/step - kl:
0.4644 - nll: -1.3782 - total_loss: -1.3594 - val_direction: 0.0030 - val_kl:
0.4638 - val_loss: -1.1604 - val_nll: -1.1804
Epoch 1159/2000
6/6             4s 630ms/step - kl:
0.4626 - nll: -1.3802 - total_loss: -1.3615 - val_direction: 0.0027 - val_kl:
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0.4611 - val_loss: -1.1756 - val_nll: -1.1954
Epoch 1160/2000
6/6            4s 709ms/step - kl:
0.4594 - nll: -1.3805 - total_loss: -1.3619 - val_direction: 0.0029 - val_kl:
0.4585 - val_loss: -1.1667 - val_nll: -1.1865
Epoch 1161/2000
6/6            5s 761ms/step - kl:
0.4576 - nll: -1.3792 - total_loss: -1.3606 - val_direction: 0.0027 - val_kl:
0.4576 - val_loss: -1.1780 - val_nll: -1.1977
Epoch 1162/2000
6/6            4s 696ms/step - kl:
0.4568 - nll: -1.3803 - total_loss: -1.3618 - val_direction: 0.0026 - val_kl:
0.4568 - val_loss: -1.1781 - val_nll: -1.1976
Epoch 1163/2000
6/6            4s 684ms/step - kl:
0.4570 - nll: -1.3805 - total_loss: -1.3620 - val_direction: 0.0031 - val_kl:
0.4591 - val_loss: -1.1535 - val_nll: -1.1734
Epoch 1164/2000
6/6            4s 644ms/step - kl:
0.4601 - nll: -1.3801 - total_loss: -1.3614 - val_direction: 0.0027 - val_kl:
0.4625 - val_loss: -1.1747 - val_nll: -1.1945
Epoch 1165/2000
6/6            4s 641ms/step - kl:
0.4633 - nll: -1.3802 - total_loss: -1.3614 - val_direction: 0.0027 - val_kl:
0.4654 - val_loss: -1.1751 - val_nll: -1.1951
Epoch 1166/2000
6/6            4s 642ms/step - kl:
0.4649 - nll: -1.3812 - total_loss: -1.3624 - val_direction: 0.0027 - val_kl:
0.4645 - val_loss: -1.1790 - val_nll: -1.1990
Epoch 1167/2000
6/6            4s 631ms/step - kl:
0.4635 - nll: -1.3821 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
0.4626 - val_loss: -1.1699 - val_nll: -1.1898
Epoch 1168/2000
6/6            4s 646ms/step - kl:
0.4616 - nll: -1.3797 - total_loss: -1.3611 - val_direction: 0.0031 - val_kl:
0.4613 - val_loss: -1.1559 - val_nll: -1.1759
Epoch 1169/2000
6/6            4s 640ms/step - kl:
0.4607 - nll: -1.3787 - total_loss: -1.3600 - val_direction: 0.0028 - val_kl:
0.4614 - val_loss: -1.1672 - val_nll: -1.1871
Epoch 1170/2000
6/6            4s 653ms/step - kl:
0.4610 - nll: -1.3817 - total_loss: -1.3631 - val_direction: 0.0021 - val_kl:
0.4610 - val_loss: -1.2108 - val_nll: -1.2303
Epoch 1171/2000
6/6            5s 827ms/step - kl:
0.4611 - nll: -1.3841 - total_loss: -1.3655 - val_direction: 0.0027 - val_kl:
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0.4629 - val_loss: -1.1773 - val_nll: -1.1971
Epoch 1172/2000
6/6            5s 779ms/step - kl:
0.4632 - nll: -1.3807 - total_loss: -1.3619 - val_direction: 0.0032 - val_kl:
0.4641 - val_loss: -1.1449 - val_nll: -1.1651
Epoch 1173/2000
6/6            4s 719ms/step - kl:
0.4632 - nll: -1.3786 - total_loss: -1.3599 - val_direction: 0.0028 - val_kl:
0.4621 - val_loss: -1.1727 - val_nll: -1.1926
Epoch 1174/2000
6/6            4s 641ms/step - kl:
0.4601 - nll: -1.3819 - total_loss: -1.3634 - val_direction: 0.0023 - val_kl:
0.4579 - val_loss: -1.1989 - val_nll: -1.2184
Epoch 1175/2000
6/6            4s 641ms/step - kl:
0.4565 - nll: -1.3831 - total_loss: -1.3647 - val_direction: 0.0023 - val_kl:
0.4560 - val_loss: -1.1992 - val_nll: -1.2186
Epoch 1176/2000
6/6            4s 642ms/step - kl:
0.4559 - nll: -1.3828 - total_loss: -1.3643 - val_direction: 0.0027 - val_kl:
0.4572 - val_loss: -1.1759 - val_nll: -1.1955
Epoch 1177/2000
6/6            4s 654ms/step - kl:
0.4569 - nll: -1.3793 - total_loss: -1.3608 - val_direction: 0.0029 - val_kl:
0.4573 - val_loss: -1.1649 - val_nll: -1.1847
Epoch 1178/2000
6/6            4s 635ms/step - kl:
0.4570 - nll: -1.3761 - total_loss: -1.3575 - val_direction: 0.0030 - val_kl:
0.4579 - val_loss: -1.1628 - val_nll: -1.1826
Epoch 1179/2000
6/6            4s 635ms/step - kl:
0.4589 - nll: -1.3800 - total_loss: -1.3613 - val_direction: 0.0026 - val_kl:
0.4612 - val_loss: -1.1814 - val_nll: -1.2012
Epoch 1180/2000
6/6            4s 636ms/step - kl:
0.4612 - nll: -1.3819 - total_loss: -1.3632 - val_direction: 0.0026 - val_kl:
0.4625 - val_loss: -1.1817 - val_nll: -1.2015
Epoch 1181/2000
6/6            5s 833ms/step - kl:
0.4624 - nll: -1.3790 - total_loss: -1.3603 - val_direction: 0.0031 - val_kl:
0.4630 - val_loss: -1.1545 - val_nll: -1.1746
Epoch 1182/2000
6/6            5s 814ms/step - kl:
0.4623 - nll: -1.3782 - total_loss: -1.3595 - val_direction: 0.0025 - val_kl:
0.4618 - val_loss: -1.1924 - val_nll: -1.2121
Epoch 1183/2000
6/6            4s 684ms/step - kl:
0.4604 - nll: -1.3839 - total_loss: -1.3653 - val_direction: 0.0024 - val_kl:
```

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0.4596 - val_loss: -1.1909 - val_nll: -1.2105
Epoch 1184/2000
6/6             4s 665ms/step - kl:
0.4590 - nll: -1.3810 - total_loss: -1.3625 - val_direction: 0.0030 - val_kl:
0.4590 - val_loss: -1.1609 - val_nll: -1.1808
Epoch 1185/2000
6/6             4s 651ms/step - kl:
0.4581 - nll: -1.3795 - total_loss: -1.3609 - val_direction: 0.0027 - val_kl:
0.4586 - val_loss: -1.1801 - val_nll: -1.1998
Epoch 1186/2000
6/6             4s 642ms/step - kl:
0.4590 - nll: -1.3817 - total_loss: -1.3631 - val_direction: 0.0025 - val_kl:
0.4605 - val_loss: -1.1887 - val_nll: -1.2083
Epoch 1187/2000
6/6             4s 629ms/step - kl:
0.4608 - nll: -1.3819 - total_loss: -1.3632 - val_direction: 0.0031 - val_kl:
0.4623 - val_loss: -1.1546 - val_nll: -1.1746
Epoch 1188/2000
6/6             4s 633ms/step - kl:
0.4622 - nll: -1.3800 - total_loss: -1.3613 - val_direction: 0.0031 - val_kl:
0.4623 - val_loss: -1.1560 - val_nll: -1.1761
Epoch 1189/2000
6/6             4s 634ms/step - kl:
0.4606 - nll: -1.3801 - total_loss: -1.3615 - val_direction: 0.0027 - val_kl:
0.4587 - val_loss: -1.1768 - val_nll: -1.1965
Epoch 1190/2000
6/6             4s 632ms/step - kl:
0.4570 - nll: -1.3821 - total_loss: -1.3637 - val_direction: 0.0024 - val_kl:
0.4561 - val_loss: -1.1948 - val_nll: -1.2143
Epoch 1191/2000
6/6             5s 799ms/step - kl:
0.4561 - nll: -1.3819 - total_loss: -1.3635 - val_direction: 0.0031 - val_kl:
0.4580 - val_loss: -1.1507 - val_nll: -1.1706
Epoch 1192/2000
6/6             5s 780ms/step - kl:
0.4585 - nll: -1.3768 - total_loss: -1.3582 - val_direction: 0.0029 - val_kl:
0.4604 - val_loss: -1.1676 - val_nll: -1.1875
Epoch 1193/2000
6/6             4s 729ms/step - kl:
0.4603 - nll: -1.3830 - total_loss: -1.3644 - val_direction: 0.0024 - val_kl:
0.4606 - val_loss: -1.1968 - val_nll: -1.2165
Epoch 1194/2000
6/6             4s 641ms/step - kl:
0.4601 - nll: -1.3826 - total_loss: -1.3640 - val_direction: 0.0028 - val_kl:
0.4599 - val_loss: -1.1710 - val_nll: -1.1908
Epoch 1195/2000
6/6             4s 659ms/step - kl:
0.4592 - nll: -1.3802 - total_loss: -1.3617 - val_direction: 0.0030 - val_kl:
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0.4596 - val_loss: -1.1573 - val_nll: -1.1772
Epoch 1196/2000
6/6            4s 648ms/step - kl:
0.4597 - nll: -1.3795 - total_loss: -1.3609 - val_direction: 0.0028 - val_kl:
0.4596 - val_loss: -1.1726 - val_nll: -1.1924
Epoch 1197/2000
6/6            4s 635ms/step - kl:
0.4582 - nll: -1.3812 - total_loss: -1.3627 - val_direction: 0.0027 - val_kl:
0.4576 - val_loss: -1.1801 - val_nll: -1.1998
Epoch 1198/2000
6/6            4s 637ms/step - kl:
0.4571 - nll: -1.3816 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4577 - val_loss: -1.1780 - val_nll: -1.1977
Epoch 1199/2000
6/6            4s 651ms/step - kl:
0.4579 - nll: -1.3813 - total_loss: -1.3627 - val_direction: 0.0029 - val_kl:
0.4593 - val_loss: -1.1641 - val_nll: -1.1840
Epoch 1200/2000
6/6            4s 719ms/step - kl:
0.4590 - nll: -1.3784 - total_loss: -1.3598 - val_direction: 0.0032 - val_kl:
0.4589 - val_loss: -1.1489 - val_nll: -1.1688
Epoch 1201/2000
6/6            5s 729ms/step - kl:
0.4578 - nll: -1.3809 - total_loss: -1.3624 - val_direction: 0.0024 - val_kl:
0.4566 - val_loss: -1.1915 - val_nll: -1.2109
Epoch 1202/2000
6/6            4s 691ms/step - kl:
0.4559 - nll: -1.3827 - total_loss: -1.3643 - val_direction: 0.0028 - val_kl:
0.4564 - val_loss: -1.1678 - val_nll: -1.1875
Epoch 1203/2000
6/6            4s 729ms/step - kl:
0.4560 - nll: -1.3794 - total_loss: -1.3609 - val_direction: 0.0028 - val_kl:
0.4567 - val_loss: -1.1717 - val_nll: -1.1914
Epoch 1204/2000
6/6            4s 693ms/step - kl:
0.4563 - nll: -1.3817 - total_loss: -1.3632 - val_direction: 0.0026 - val_kl:
0.4567 - val_loss: -1.1809 - val_nll: -1.2004
Epoch 1205/2000
6/6            4s 680ms/step - kl:
0.4558 - nll: -1.3816 - total_loss: -1.3632 - val_direction: 0.0025 - val_kl:
0.4548 - val_loss: -1.1897 - val_nll: -1.2091
Epoch 1206/2000
6/6            4s 708ms/step - kl:
0.4537 - nll: -1.3828 - total_loss: -1.3645 - val_direction: 0.0026 - val_kl:
0.4537 - val_loss: -1.1850 - val_nll: -1.2044
Epoch 1207/2000
6/6            4s 679ms/step - kl:
0.4542 - nll: -1.3804 - total_loss: -1.3619 - val_direction: 0.0030 - val_kl:
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0.4559 - val_loss: -1.1566 - val_nll: -1.1763
Epoch 1208/2000
6/6             4s 642ms/step - kl:
0.4556 - nll: -1.3778 - total_loss: -1.3593 - val_direction: 0.0030 - val_kl:
0.4556 - val_loss: -1.1604 - val_nll: -1.1802
Epoch 1209/2000
6/6             4s 634ms/step - kl:
0.4550 - nll: -1.3813 - total_loss: -1.3629 - val_direction: 0.0025 - val_kl:
0.4560 - val_loss: -1.1917 - val_nll: -1.2112
Epoch 1210/2000
6/6             4s 632ms/step - kl:
0.4561 - nll: -1.3820 - total_loss: -1.3636 - val_direction: 0.0025 - val_kl:
0.4569 - val_loss: -1.1890 - val_nll: -1.2085
Epoch 1211/2000
6/6             4s 641ms/step - kl:
0.4565 - nll: -1.3821 - total_loss: -1.3637 - val_direction: 0.0028 - val_kl:
0.4563 - val_loss: -1.1744 - val_nll: -1.1941
Epoch 1212/2000
6/6             5s 806ms/step - kl:
0.4558 - nll: -1.3787 - total_loss: -1.3603 - val_direction: 0.0028 - val_kl:
0.4563 - val_loss: -1.1705 - val_nll: -1.1901
Epoch 1213/2000
6/6             5s 776ms/step - kl:
0.4557 - nll: -1.3797 - total_loss: -1.3613 - val_direction: 0.0028 - val_kl:
0.4560 - val_loss: -1.1731 - val_nll: -1.1928
Epoch 1214/2000
6/6             4s 739ms/step - kl:
0.4560 - nll: -1.3815 - total_loss: -1.3630 - val_direction: 0.0028 - val_kl:
0.4575 - val_loss: -1.1733 - val_nll: -1.1930
Epoch 1215/2000
6/6             4s 642ms/step - kl:
0.4576 - nll: -1.3807 - total_loss: -1.3621 - val_direction: 0.0027 - val_kl:
0.4585 - val_loss: -1.1797 - val_nll: -1.1993
Epoch 1216/2000
6/6             4s 647ms/step - kl:
0.4580 - nll: -1.3817 - total_loss: -1.3632 - val_direction: 0.0028 - val_kl:
0.4587 - val_loss: -1.1777 - val_nll: -1.1974
Epoch 1217/2000
6/6             4s 641ms/step - kl:
0.4582 - nll: -1.3809 - total_loss: -1.3624 - val_direction: 0.0030 - val_kl:
0.4578 - val_loss: -1.1559 - val_nll: -1.1757
Epoch 1218/2000
6/6             4s 638ms/step - kl:
0.4564 - nll: -1.3799 - total_loss: -1.3614 - val_direction: 0.0026 - val_kl:
0.4546 - val_loss: -1.1826 - val_nll: -1.2021
Epoch 1219/2000
6/6             4s 631ms/step - kl:
0.4535 - nll: -1.3814 - total_loss: -1.3631 - val_direction: 0.0026 - val_kl:
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0.4526 - val_loss: -1.1838 - val_nll: -1.2032
Epoch 1220/2000
6/6            4s 639ms/step - kl:
0.4524 - nll: -1.3832 - total_loss: -1.3649 - val_direction: 0.0025 - val_kl:
0.4534 - val_loss: -1.1864 - val_nll: -1.2058
Epoch 1221/2000
6/6            4s 643ms/step - kl:
0.4538 - nll: -1.3805 - total_loss: -1.3620 - val_direction: 0.0027 - val_kl:
0.4553 - val_loss: -1.1797 - val_nll: -1.1993
Epoch 1222/2000
6/6            5s 811ms/step - kl:
0.4544 - nll: -1.3817 - total_loss: -1.3634 - val_direction: 0.0025 - val_kl:
0.4535 - val_loss: -1.1910 - val_nll: -1.2104
Epoch 1223/2000
6/6            5s 812ms/step - kl:
0.4529 - nll: -1.3826 - total_loss: -1.3643 - val_direction: 0.0028 - val_kl:
0.4536 - val_loss: -1.1707 - val_nll: -1.1902
Epoch 1224/2000
6/6            4s 662ms/step - kl:
0.4535 - nll: -1.3788 - total_loss: -1.3604 - val_direction: 0.0032 - val_kl:
0.4547 - val_loss: -1.1463 - val_nll: -1.1661
Epoch 1225/2000
6/6            4s 675ms/step - kl:
0.4547 - nll: -1.3802 - total_loss: -1.3618 - val_direction: 0.0026 - val_kl:
0.4558 - val_loss: -1.1871 - val_nll: -1.2066
Epoch 1226/2000
6/6            4s 653ms/step - kl:
0.4552 - nll: -1.3807 - total_loss: -1.3623 - val_direction: 0.0030 - val_kl:
0.4551 - val_loss: -1.1558 - val_nll: -1.1755
Epoch 1227/2000
6/6            4s 645ms/step - kl:
0.4544 - nll: -1.3780 - total_loss: -1.3596 - val_direction: 0.0029 - val_kl:
0.4541 - val_loss: -1.1660 - val_nll: -1.1856
Epoch 1228/2000
6/6            4s 636ms/step - kl:
0.4534 - nll: -1.3805 - total_loss: -1.3622 - val_direction: 0.0025 - val_kl:
0.4528 - val_loss: -1.1877 - val_nll: -1.2071
Epoch 1229/2000
6/6            4s 656ms/step - kl:
0.4520 - nll: -1.3823 - total_loss: -1.3641 - val_direction: 0.0025 - val_kl:
0.4531 - val_loss: -1.1898 - val_nll: -1.2092
Epoch 1230/2000
6/6            4s 634ms/step - kl:
0.4540 - nll: -1.3809 - total_loss: -1.3625 - val_direction: 0.0029 - val_kl:
0.4559 - val_loss: -1.1647 - val_nll: -1.1844
Epoch 1231/2000
6/6            4s 632ms/step - kl:
0.4550 - nll: -1.3793 - total_loss: -1.3609 - val_direction: 0.0027 - val_kl:
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0.4547 - val_loss: -1.1794 - val_nll: -1.1989
Epoch 1232/2000
6/6            4s 683ms/step - kl:
0.4536 - nll: -1.3830 - total_loss: -1.3647 - val_direction: 0.0025 - val_kl:
0.4533 - val_loss: -1.1895 - val_nll: -1.2089
Epoch 1233/2000
6/6            5s 785ms/step - kl:
0.4534 - nll: -1.3823 - total_loss: -1.3639 - val_direction: 0.0030 - val_kl:
0.4540 - val_loss: -1.1609 - val_nll: -1.1806
Epoch 1234/2000
6/6            4s 724ms/step - kl:
0.4531 - nll: -1.3804 - total_loss: -1.3621 - val_direction: 0.0028 - val_kl:
0.4529 - val_loss: -1.1755 - val_nll: -1.1950
Epoch 1235/2000
6/6            4s 721ms/step - kl:
0.4517 - nll: -1.3809 - total_loss: -1.3627 - val_direction: 0.0024 - val_kl:
0.4512 - val_loss: -1.1940 - val_nll: -1.2133
Epoch 1236/2000
6/6            4s 676ms/step - kl:
0.4510 - nll: -1.3819 - total_loss: -1.3636 - val_direction: 0.0027 - val_kl:
0.4521 - val_loss: -1.1747 - val_nll: -1.1942
Epoch 1237/2000
6/6            4s 651ms/step - kl:
0.4520 - nll: -1.3825 - total_loss: -1.3642 - val_direction: 0.0026 - val_kl:
0.4526 - val_loss: -1.1848 - val_nll: -1.2042
Epoch 1238/2000
6/6            4s 636ms/step - kl:
0.4518 - nll: -1.3815 - total_loss: -1.3633 - val_direction: 0.0028 - val_kl:
0.4509 - val_loss: -1.1739 - val_nll: -1.1933
Epoch 1239/2000
6/6            4s 642ms/step - kl:
0.4494 - nll: -1.3821 - total_loss: -1.3639 - val_direction: 0.0027 - val_kl:
0.4487 - val_loss: -1.1800 - val_nll: -1.1993
Epoch 1240/2000
6/6            4s 639ms/step - kl:
0.4482 - nll: -1.3816 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
0.4490 - val_loss: -1.1680 - val_nll: -1.1874
Epoch 1241/2000
6/6            4s 632ms/step - kl:
0.4495 - nll: -1.3794 - total_loss: -1.3611 - val_direction: 0.0030 - val_kl:
0.4513 - val_loss: -1.1614 - val_nll: -1.1810
Epoch 1242/2000
6/6            4s 649ms/step - kl:
0.4508 - nll: -1.3804 - total_loss: -1.3621 - val_direction: 0.0025 - val_kl:
0.4507 - val_loss: -1.1860 - val_nll: -1.2053
Epoch 1243/2000
6/6            5s 838ms/step - kl:
0.4500 - nll: -1.3831 - total_loss: -1.3649 - val_direction: 0.0027 - val_kl:
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0.4505 - val_loss: -1.1780 - val_nll: -1.1974
Epoch 1244/2000
6/6            5s 807ms/step - kl:
0.4504 - nll: -1.3797 - total_loss: -1.3614 - val_direction: 0.0033 - val_kl:
0.4515 - val_loss: -1.1427 - val_nll: -1.1624
Epoch 1245/2000
6/6            4s 711ms/step - kl:
0.4510 - nll: -1.3792 - total_loss: -1.3609 - val_direction: 0.0027 - val_kl:
0.4512 - val_loss: -1.1804 - val_nll: -1.1998
Epoch 1246/2000
6/6            4s 645ms/step - kl:
0.4506 - nll: -1.3818 - total_loss: -1.3636 - val_direction: 0.0025 - val_kl:
0.4505 - val_loss: -1.1856 - val_nll: -1.2049
Epoch 1247/2000
6/6            4s 651ms/step - kl:
0.4498 - nll: -1.3828 - total_loss: -1.3646 - val_direction: 0.0025 - val_kl:
0.4502 - val_loss: -1.1885 - val_nll: -1.2077
Epoch 1248/2000
6/6            4s 641ms/step - kl:
0.4509 - nll: -1.3821 - total_loss: -1.3639 - val_direction: 0.0029 - val_kl:
0.4533 - val_loss: -1.1641 - val_nll: -1.1837
Epoch 1249/2000
6/6            4s 636ms/step - kl:
0.4530 - nll: -1.3790 - total_loss: -1.3606 - val_direction: 0.0031 - val_kl:
0.4531 - val_loss: -1.1576 - val_nll: -1.1773
Epoch 1250/2000
6/6            4s 639ms/step - kl:
0.4522 - nll: -1.3785 - total_loss: -1.3602 - val_direction: 0.0025 - val_kl:
0.4517 - val_loss: -1.1918 - val_nll: -1.2111
Epoch 1251/2000
6/6            4s 664ms/step - kl:
0.4505 - nll: -1.3831 - total_loss: -1.3649 - val_direction: 0.0022 - val_kl:
0.4506 - val_loss: -1.2103 - val_nll: -1.2294
Epoch 1252/2000
6/6            4s 636ms/step - kl:
0.4510 - nll: -1.3833 - total_loss: -1.3650 - val_direction: 0.0030 - val_kl:
0.4529 - val_loss: -1.1591 - val_nll: -1.1788
Epoch 1253/2000
6/6            5s 792ms/step - kl:
0.4530 - nll: -1.3790 - total_loss: -1.3606 - val_direction: 0.0031 - val_kl:
0.4539 - val_loss: -1.1533 - val_nll: -1.1730
Epoch 1254/2000
6/6            5s 825ms/step - kl:
0.4528 - nll: -1.3792 - total_loss: -1.3608 - val_direction: 0.0027 - val_kl:
0.4508 - val_loss: -1.1804 - val_nll: -1.1998
Epoch 1255/2000
6/6            4s 685ms/step - kl:
0.4484 - nll: -1.3813 - total_loss: -1.3633 - val_direction: 0.0027 - val_kl:
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0.4466 - val_loss: -1.1788 - val_nll: -1.1980
Epoch 1256/2000
6/6             4s 709ms/step - kl:
0.4460 - nll: -1.3811 - total_loss: -1.3630 - val_direction: 0.0029 - val_kl:
0.4472 - val_loss: -1.1687 - val_nll: -1.1880
Epoch 1257/2000
6/6             4s 646ms/step - kl:
0.4482 - nll: -1.3800 - total_loss: -1.3618 - val_direction: 0.0028 - val_kl:
0.4515 - val_loss: -1.1714 - val_nll: -1.1909
Epoch 1258/2000
6/6             4s 666ms/step - kl:
0.4526 - nll: -1.3822 - total_loss: -1.3638 - val_direction: 0.0027 - val_kl:
0.4556 - val_loss: -1.1749 - val_nll: -1.1945
Epoch 1259/2000
6/6             4s 713ms/step - kl:
0.4556 - nll: -1.3827 - total_loss: -1.3643 - val_direction: 0.0028 - val_kl:
0.4554 - val_loss: -1.1747 - val_nll: -1.1943
Epoch 1260/2000
6/6             4s 713ms/step - kl:
0.4538 - nll: -1.3826 - total_loss: -1.3644 - val_direction: 0.0027 - val_kl:
0.4519 - val_loss: -1.1740 - val_nll: -1.1935
Epoch 1261/2000
6/6             4s 633ms/step - kl:
0.4506 - nll: -1.3816 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
0.4491 - val_loss: -1.1732 - val_nll: -1.1926
Epoch 1262/2000
6/6             4s 636ms/step - kl:
0.4471 - nll: -1.3821 - total_loss: -1.3641 - val_direction: 0.0026 - val_kl:
0.4455 - val_loss: -1.1868 - val_nll: -1.2059
Epoch 1263/2000
6/6             5s 795ms/step - kl:
0.4446 - nll: -1.3816 - total_loss: -1.3637 - val_direction: 0.0028 - val_kl:
0.4453 - val_loss: -1.1716 - val_nll: -1.1908
Epoch 1264/2000
6/6             5s 809ms/step - kl:
0.4451 - nll: -1.3799 - total_loss: -1.3619 - val_direction: 0.0029 - val_kl:
0.4462 - val_loss: -1.1683 - val_nll: -1.1876
Epoch 1265/2000
6/6             4s 736ms/step - kl:
0.4465 - nll: -1.3822 - total_loss: -1.3642 - val_direction: 0.0022 - val_kl:
0.4475 - val_loss: -1.2074 - val_nll: -1.2264
Epoch 1266/2000
6/6             4s 736ms/step - kl:
0.4476 - nll: -1.3831 - total_loss: -1.3650 - val_direction: 0.0029 - val_kl:
0.4497 - val_loss: -1.1638 - val_nll: -1.1833
Epoch 1267/2000
6/6             4s 644ms/step - kl:
0.4500 - nll: -1.3784 - total_loss: -1.3601 - val_direction: 0.0030 - val_kl:
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0.4512 - val_loss: -1.1636 - val_nll: -1.1832
Epoch 1268/2000
6/6             4s 641ms/step - kl:
0.4510 - nll: -1.3787 - total_loss: -1.3604 - val_direction: 0.0026 - val_kl:
0.4510 - val_loss: -1.1825 - val_nll: -1.2018
Epoch 1269/2000
6/6             4s 634ms/step - kl:
0.4497 - nll: -1.3825 - total_loss: -1.3644 - val_direction: 0.0027 - val_kl:
0.4488 - val_loss: -1.1784 - val_nll: -1.1977
Epoch 1270/2000
6/6             4s 633ms/step - kl:
0.4471 - nll: -1.3806 - total_loss: -1.3626 - val_direction: 0.0027 - val_kl:
0.4451 - val_loss: -1.1790 - val_nll: -1.1982
Epoch 1271/2000
6/6             4s 636ms/step - kl:
0.4439 - nll: -1.3809 - total_loss: -1.3630 - val_direction: 0.0027 - val_kl:
0.4443 - val_loss: -1.1820 - val_nll: -1.2011
Epoch 1272/2000
6/6             4s 636ms/step - kl:
0.4446 - nll: -1.3813 - total_loss: -1.3632 - val_direction: 0.0028 - val_kl:
0.4461 - val_loss: -1.1735 - val_nll: -1.1927
Epoch 1273/2000
6/6             5s 802ms/step - kl:
0.4460 - nll: -1.3804 - total_loss: -1.3624 - val_direction: 0.0028 - val_kl:
0.4469 - val_loss: -1.1714 - val_nll: -1.1907
Epoch 1274/2000
6/6             4s 728ms/step - kl:
0.4467 - nll: -1.3825 - total_loss: -1.3645 - val_direction: 0.0025 - val_kl:
0.4472 - val_loss: -1.1893 - val_nll: -1.2085
Epoch 1275/2000
6/6             4s 699ms/step - kl:
0.4472 - nll: -1.3828 - total_loss: -1.3647 - val_direction: 0.0030 - val_kl:
0.4484 - val_loss: -1.1572 - val_nll: -1.1767
Epoch 1276/2000
6/6             4s 736ms/step - kl:
0.4485 - nll: -1.3764 - total_loss: -1.3582 - val_direction: 0.0033 - val_kl:
0.4490 - val_loss: -1.1450 - val_nll: -1.1646
Epoch 1277/2000
6/6             4s 649ms/step - kl:
0.4475 - nll: -1.3793 - total_loss: -1.3612 - val_direction: 0.0024 - val_kl:
0.4457 - val_loss: -1.1951 - val_nll: -1.2141
Epoch 1278/2000
6/6             4s 655ms/step - kl:
0.4446 - nll: -1.3824 - total_loss: -1.3644 - val_direction: 0.0026 - val_kl:
0.4449 - val_loss: -1.1812 - val_nll: -1.2003
Epoch 1279/2000
6/6             4s 641ms/step - kl:
0.4456 - nll: -1.3810 - total_loss: -1.3630 - val_direction: 0.0028 - val_kl:
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0.4475 - val_loss: -1.1718 - val_nll: -1.1911
Epoch 1280/2000
6/6             4s 652ms/step - kl:
0.4482 - nll: -1.3812 - total_loss: -1.3631 - val_direction: 0.0025 - val_kl:
0.4495 - val_loss: -1.1896 - val_nll: -1.2088
Epoch 1281/2000
6/6             4s 636ms/step - kl:
0.4490 - nll: -1.3803 - total_loss: -1.3622 - val_direction: 0.0029 - val_kl:
0.4490 - val_loss: -1.1676 - val_nll: -1.1870
Epoch 1282/2000
6/6             4s 634ms/step - kl:
0.4478 - nll: -1.3799 - total_loss: -1.3618 - val_direction: 0.0025 - val_kl:
0.4474 - val_loss: -1.1881 - val_nll: -1.2073
Epoch 1283/2000
6/6             4s 740ms/step - kl:
0.4474 - nll: -1.3828 - total_loss: -1.3647 - val_direction: 0.0025 - val_kl:
0.4488 - val_loss: -1.1876 - val_nll: -1.2068
Epoch 1284/2000
6/6             4s 716ms/step - kl:
0.4492 - nll: -1.3827 - total_loss: -1.3645 - val_direction: 0.0029 - val_kl:
0.4505 - val_loss: -1.1669 - val_nll: -1.1863
Epoch 1285/2000
6/6             4s 701ms/step - kl:
0.4500 - nll: -1.3801 - total_loss: -1.3619 - val_direction: 0.0030 - val_kl:
0.4500 - val_loss: -1.1610 - val_nll: -1.1805
Epoch 1286/2000
6/6             4s 674ms/step - kl:
0.4487 - nll: -1.3805 - total_loss: -1.3624 - val_direction: 0.0030 - val_kl:
0.4471 - val_loss: -1.1595 - val_nll: -1.1789
Epoch 1287/2000
6/6             4s 711ms/step - kl:
0.4457 - nll: -1.3780 - total_loss: -1.3600 - val_direction: 0.0028 - val_kl:
0.4446 - val_loss: -1.1749 - val_nll: -1.1940
Epoch 1288/2000
6/6             4s 669ms/step - kl:
0.4440 - nll: -1.3825 - total_loss: -1.3645 - val_direction: 0.0027 - val_kl:
0.4448 - val_loss: -1.1792 - val_nll: -1.1983
Epoch 1289/2000
6/6             4s 644ms/step - kl:
0.4450 - nll: -1.3811 - total_loss: -1.3631 - val_direction: 0.0024 - val_kl:
0.4453 - val_loss: -1.1934 - val_nll: -1.2124
Epoch 1290/2000
6/6             4s 647ms/step - kl:
0.4451 - nll: -1.3828 - total_loss: -1.3648 - val_direction: 0.0029 - val_kl:
0.4464 - val_loss: -1.1680 - val_nll: -1.1873
Epoch 1291/2000
6/6             4s 642ms/step - kl:
0.4468 - nll: -1.3794 - total_loss: -1.3613 - val_direction: 0.0030 - val_kl:
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0.4476 - val_loss: -1.1626 - val_nll: -1.1820
Epoch 1292/2000
6/6            4s 633ms/step - kl:
0.4466 - nll: -1.3826 - total_loss: -1.3646 - val_direction: 0.0024 - val_kl:
0.4458 - val_loss: -1.1959 - val_nll: -1.2149
Epoch 1293/2000
6/6            4s 652ms/step - kl:
0.4452 - nll: -1.3818 - total_loss: -1.3638 - val_direction: 0.0030 - val_kl:
0.4456 - val_loss: -1.1592 - val_nll: -1.1785
Epoch 1294/2000
6/6            5s 786ms/step - kl:
0.4445 - nll: -1.3797 - total_loss: -1.3617 - val_direction: 0.0028 - val_kl:
0.4440 - val_loss: -1.1715 - val_nll: -1.1907
Epoch 1295/2000
6/6            4s 760ms/step - kl:
0.4432 - nll: -1.3816 - total_loss: -1.3636 - val_direction: 0.0027 - val_kl:
0.4445 - val_loss: -1.1770 - val_nll: -1.1961
Epoch 1296/2000
6/6            4s 742ms/step - kl:
0.4454 - nll: -1.3815 - total_loss: -1.3634 - val_direction: 0.0027 - val_kl:
0.4479 - val_loss: -1.1761 - val_nll: -1.1953
Epoch 1297/2000
6/6            4s 649ms/step - kl:
0.4481 - nll: -1.3830 - total_loss: -1.3649 - val_direction: 0.0026 - val_kl:
0.4487 - val_loss: -1.1807 - val_nll: -1.1999
Epoch 1298/2000
6/6            4s 646ms/step - kl:
0.4478 - nll: -1.3828 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.4465 - val_loss: -1.1830 - val_nll: -1.2022
Epoch 1299/2000
6/6            4s 647ms/step - kl:
0.4444 - nll: -1.3810 - total_loss: -1.3631 - val_direction: 0.0030 - val_kl:
0.4432 - val_loss: -1.1614 - val_nll: -1.1806
Epoch 1300/2000
6/6            4s 636ms/step - kl:
0.4422 - nll: -1.3795 - total_loss: -1.3616 - val_direction: 0.0027 - val_kl:
0.4423 - val_loss: -1.1808 - val_nll: -1.1998
Epoch 1301/2000
6/6            4s 642ms/step - kl:
0.4426 - nll: -1.3813 - total_loss: -1.3633 - val_direction: 0.0026 - val_kl:
0.4440 - val_loss: -1.1828 - val_nll: -1.2018
Epoch 1302/2000
6/6            4s 640ms/step - kl:
0.4447 - nll: -1.3810 - total_loss: -1.3629 - val_direction: 0.0029 - val_kl:
0.4463 - val_loss: -1.1671 - val_nll: -1.1863
Epoch 1303/2000
6/6            4s 652ms/step - kl:
0.4456 - nll: -1.3795 - total_loss: -1.3614 - val_direction: 0.0031 - val_kl:
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0.4454 - val_loss: -1.1523 - val_nll: -1.1717
Epoch 1304/2000
6/6             4s 765ms/step - kl:
0.4448 - nll: -1.3796 - total_loss: -1.3615 - val_direction: 0.0026 - val_kl:
0.4446 - val_loss: -1.1872 - val_nll: -1.2063
Epoch 1305/2000
6/6             4s 744ms/step - kl:
0.4439 - nll: -1.3833 - total_loss: -1.3654 - val_direction: 0.0024 - val_kl:
0.4445 - val_loss: -1.1958 - val_nll: -1.2147
Epoch 1306/2000
6/6             4s 707ms/step - kl:
0.4451 - nll: -1.3826 - total_loss: -1.3646 - val_direction: 0.0032 - val_kl:
0.4468 - val_loss: -1.1509 - val_nll: -1.1704
Epoch 1307/2000
6/6             4s 649ms/step - kl:
0.4454 - nll: -1.3778 - total_loss: -1.3597 - val_direction: 0.0027 - val_kl:
0.4440 - val_loss: -1.1797 - val_nll: -1.1988
Epoch 1308/2000
6/6             4s 646ms/step - kl:
0.4431 - nll: -1.3826 - total_loss: -1.3647 - val_direction: 0.0024 - val_kl:
0.4435 - val_loss: -1.1944 - val_nll: -1.2133
Epoch 1309/2000
6/6             4s 651ms/step - kl:
0.4438 - nll: -1.3811 - total_loss: -1.3632 - val_direction: 0.0031 - val_kl:
0.4447 - val_loss: -1.1530 - val_nll: -1.1724
Epoch 1310/2000
6/6             4s 665ms/step - kl:
0.4436 - nll: -1.3791 - total_loss: -1.3611 - val_direction: 0.0024 - val_kl:
0.4420 - val_loss: -1.1973 - val_nll: -1.2162
Epoch 1311/2000
6/6             4s 637ms/step - kl:
0.4408 - nll: -1.3826 - total_loss: -1.3648 - val_direction: 0.0024 - val_kl:
0.4411 - val_loss: -1.1924 - val_nll: -1.2113
Epoch 1312/2000
6/6             4s 634ms/step - kl:
0.4416 - nll: -1.3828 - total_loss: -1.3649 - val_direction: 0.0031 - val_kl:
0.4438 - val_loss: -1.1495 - val_nll: -1.1688
Epoch 1313/2000
6/6             4s 643ms/step - kl:
0.4442 - nll: -1.3784 - total_loss: -1.3604 - val_direction: 0.0030 - val_kl:
0.4450 - val_loss: -1.1634 - val_nll: -1.1827
Epoch 1314/2000
6/6             5s 794ms/step - kl:
0.4440 - nll: -1.3805 - total_loss: -1.3626 - val_direction: 0.0025 - val_kl:
0.4432 - val_loss: -1.1924 - val_nll: -1.2113
Epoch 1315/2000
6/6             4s 698ms/step - kl:
0.4427 - nll: -1.3824 - total_loss: -1.3645 - val_direction: 0.0025 - val_kl:
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0.4428 - val_loss: -1.1904 - val_nll: -1.2094
Epoch 1316/2000
6/6             4s 671ms/step - kl:
0.4420 - nll: -1.3812 - total_loss: -1.3633 - val_direction: 0.0030 - val_kl:
0.4424 - val_loss: -1.1606 - val_nll: -1.1798
Epoch 1317/2000
6/6             4s 724ms/step - kl:
0.4421 - nll: -1.3799 - total_loss: -1.3620 - val_direction: 0.0025 - val_kl:
0.4430 - val_loss: -1.1907 - val_nll: -1.2096
Epoch 1318/2000
6/6             4s 660ms/step - kl:
0.4430 - nll: -1.3802 - total_loss: -1.3623 - val_direction: 0.0026 - val_kl:
0.4432 - val_loss: -1.1834 - val_nll: -1.2024
Epoch 1319/2000
6/6             4s 646ms/step - kl:
0.4419 - nll: -1.3847 - total_loss: -1.3669 - val_direction: 0.0023 - val_kl:
0.4415 - val_loss: -1.2018 - val_nll: -1.2206
Epoch 1320/2000
6/6             4s 640ms/step - kl:
0.4415 - nll: -1.3794 - total_loss: -1.3615 - val_direction: 0.0034 - val_kl:
0.4431 - val_loss: -1.1358 - val_nll: -1.1552
Epoch 1321/2000
6/6             4s 638ms/step - kl:
0.4431 - nll: -1.3785 - total_loss: -1.3605 - val_direction: 0.0022 - val_kl:
0.4429 - val_loss: -1.2084 - val_nll: -1.2272
Epoch 1322/2000
6/6             4s 635ms/step - kl:
0.4422 - nll: -1.3823 - total_loss: -1.3644 - val_direction: 0.0024 - val_kl:
0.4428 - val_loss: -1.1929 - val_nll: -1.2118
Epoch 1323/2000
6/6             4s 638ms/step - kl:
0.4431 - nll: -1.3808 - total_loss: -1.3628 - val_direction: 0.0031 - val_kl:
0.4441 - val_loss: -1.1531 - val_nll: -1.1724
Epoch 1324/2000
6/6             5s 793ms/step - kl:
0.4427 - nll: -1.3796 - total_loss: -1.3617 - val_direction: 0.0027 - val_kl:
0.4420 - val_loss: -1.1773 - val_nll: -1.1964
Epoch 1325/2000
6/6             4s 732ms/step - kl:
0.4412 - nll: -1.3818 - total_loss: -1.3640 - val_direction: 0.0028 - val_kl:
0.4412 - val_loss: -1.1672 - val_nll: -1.1863
Epoch 1326/2000
6/6             4s 661ms/step - kl:
0.4402 - nll: -1.3799 - total_loss: -1.3621 - val_direction: 0.0029 - val_kl:
0.4392 - val_loss: -1.1719 - val_nll: -1.1909
Epoch 1327/2000
6/6             4s 696ms/step - kl:
0.4386 - nll: -1.3821 - total_loss: -1.3644 - val_direction: 0.0024 - val_kl:
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0.4401 - val_loss: -1.1989 - val_nll: -1.2177
Epoch 1328/2000
6/6             4s 642ms/step - kl:
0.4414 - nll: -1.3817 - total_loss: -1.3638 - val_direction: 0.0028 - val_kl:
0.4441 - val_loss: -1.1710 - val_nll: -1.1902
Epoch 1329/2000
6/6             4s 645ms/step - kl:
0.4442 - nll: -1.3798 - total_loss: -1.3618 - val_direction: 0.0027 - val_kl:
0.4446 - val_loss: -1.1776 - val_nll: -1.1968
Epoch 1330/2000
6/6             4s 638ms/step - kl:
0.4437 - nll: -1.3820 - total_loss: -1.3641 - val_direction: 0.0028 - val_kl:
0.4429 - val_loss: -1.1700 - val_nll: -1.1891
Epoch 1331/2000
6/6             4s 640ms/step - kl:
0.4418 - nll: -1.3805 - total_loss: -1.3627 - val_direction: 0.0030 - val_kl:
0.4409 - val_loss: -1.1616 - val_nll: -1.1807
Epoch 1332/2000
6/6             4s 647ms/step - kl:
0.4396 - nll: -1.3808 - total_loss: -1.3630 - val_direction: 0.0026 - val_kl:
0.4389 - val_loss: -1.1838 - val_nll: -1.2026
Epoch 1333/2000
6/6             4s 656ms/step - kl:
0.4385 - nll: -1.3825 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.4397 - val_loss: -1.1822 - val_nll: -1.2011
Epoch 1334/2000
6/6             4s 633ms/step - kl:
0.4391 - nll: -1.3828 - total_loss: -1.3651 - val_direction: 0.0027 - val_kl:
0.4391 - val_loss: -1.1810 - val_nll: -1.1999
Epoch 1335/2000
6/6             5s 820ms/step - kl:
0.4386 - nll: -1.3807 - total_loss: -1.3629 - val_direction: 0.0028 - val_kl:
0.4387 - val_loss: -1.1761 - val_nll: -1.1950
Epoch 1336/2000
6/6             5s 800ms/step - kl:
0.4380 - nll: -1.3802 - total_loss: -1.3624 - val_direction: 0.0027 - val_kl:
0.4390 - val_loss: -1.1753 - val_nll: -1.1942
Epoch 1337/2000
6/6             4s 696ms/step - kl:
0.4391 - nll: -1.3845 - total_loss: -1.3668 - val_direction: 0.0026 - val_kl:
0.4405 - val_loss: -1.1859 - val_nll: -1.2048
Epoch 1338/2000
6/6             4s 725ms/step - kl:
0.4405 - nll: -1.3810 - total_loss: -1.3631 - val_direction: 0.0031 - val_kl:
0.4412 - val_loss: -1.1513 - val_nll: -1.1705
Epoch 1339/2000
6/6             4s 647ms/step - kl:
0.4405 - nll: -1.3804 - total_loss: -1.3626 - val_direction: 0.0029 - val_kl:
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0.4399 - val_loss: -1.1719 - val_nll: -1.1910
Epoch 1340/2000
6/6             4s 695ms/step - kl:
0.4390 - nll: -1.3806 - total_loss: -1.3628 - val_direction: 0.0024 - val_kl:
0.4386 - val_loss: -1.1967 - val_nll: -1.2155
Epoch 1341/2000
6/6             4s 661ms/step - kl:
0.4377 - nll: -1.3843 - total_loss: -1.3666 - val_direction: 0.0027 - val_kl:
0.4377 - val_loss: -1.1789 - val_nll: -1.1978
Epoch 1342/2000
6/6             4s 692ms/step - kl:
0.4379 - nll: -1.3810 - total_loss: -1.3633 - val_direction: 0.0030 - val_kl:
0.4402 - val_loss: -1.1575 - val_nll: -1.1767
Epoch 1343/2000
6/6             4s 634ms/step - kl:
0.4408 - nll: -1.3797 - total_loss: -1.3618 - val_direction: 0.0027 - val_kl:
0.4420 - val_loss: -1.1800 - val_nll: -1.1990
Epoch 1344/2000
6/6             4s 635ms/step - kl:
0.4419 - nll: -1.3804 - total_loss: -1.3625 - val_direction: 0.0028 - val_kl:
0.4422 - val_loss: -1.1709 - val_nll: -1.1900
Epoch 1345/2000
6/6             5s 807ms/step - kl:
0.4411 - nll: -1.3803 - total_loss: -1.3625 - val_direction: 0.0027 - val_kl:
0.4402 - val_loss: -1.1757 - val_nll: -1.1947
Epoch 1346/2000
6/6             5s 826ms/step - kl:
0.4392 - nll: -1.3813 - total_loss: -1.3636 - val_direction: 0.0029 - val_kl:
0.4385 - val_loss: -1.1649 - val_nll: -1.1839
Epoch 1347/2000
6/6             4s 692ms/step - kl:
0.4377 - nll: -1.3796 - total_loss: -1.3618 - val_direction: 0.0026 - val_kl:
0.4380 - val_loss: -1.1827 - val_nll: -1.2015
Epoch 1348/2000
6/6             4s 675ms/step - kl:
0.4382 - nll: -1.3829 - total_loss: -1.3651 - val_direction: 0.0025 - val_kl:
0.4396 - val_loss: -1.1912 - val_nll: -1.2100
Epoch 1349/2000
6/6             4s 648ms/step - kl:
0.4401 - nll: -1.3802 - total_loss: -1.3624 - val_direction: 0.0033 - val_kl:
0.4413 - val_loss: -1.1432 - val_nll: -1.1625
Epoch 1350/2000
6/6             4s 643ms/step - kl:
0.4405 - nll: -1.3782 - total_loss: -1.3603 - val_direction: 0.0029 - val_kl:
0.4396 - val_loss: -1.1695 - val_nll: -1.1885
Epoch 1351/2000
6/6             4s 633ms/step - kl:
0.4391 - nll: -1.3817 - total_loss: -1.3640 - val_direction: 0.0022 - val_kl:
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0.4391 - val_loss: -1.2040 - val_nll: -1.2226
Epoch 1352/2000
6/6             4s 638ms/step - kl:
0.4384 - nll: -1.3846 - total_loss: -1.3669 - val_direction: 0.0027 - val_kl:
0.4385 - val_loss: -1.1766 - val_nll: -1.1955
Epoch 1353/2000
6/6             4s 640ms/step - kl:
0.4386 - nll: -1.3802 - total_loss: -1.3624 - val_direction: 0.0032 - val_kl:
0.4395 - val_loss: -1.1492 - val_nll: -1.1684
Epoch 1354/2000
6/6             4s 648ms/step - kl:
0.4390 - nll: -1.3786 - total_loss: -1.3608 - val_direction: 0.0026 - val_kl:
0.4383 - val_loss: -1.1864 - val_nll: -1.2052
Epoch 1355/2000
6/6             5s 840ms/step - kl:
0.4372 - nll: -1.3841 - total_loss: -1.3665 - val_direction: 0.0022 - val_kl:
0.4371 - val_loss: -1.2057 - val_nll: -1.2243
Epoch 1356/2000
6/6             5s 783ms/step - kl:
0.4376 - nll: -1.3817 - total_loss: -1.3639 - val_direction: 0.0032 - val_kl:
0.4401 - val_loss: -1.1462 - val_nll: -1.1654
Epoch 1357/2000
6/6             4s 720ms/step - kl:
0.4402 - nll: -1.3783 - total_loss: -1.3604 - val_direction: 0.0029 - val_kl:
0.4403 - val_loss: -1.1714 - val_nll: -1.1904
Epoch 1358/2000
6/6             4s 648ms/step - kl:
0.4386 - nll: -1.3823 - total_loss: -1.3646 - val_direction: 0.0023 - val_kl:
0.4373 - val_loss: -1.2001 - val_nll: -1.2187
Epoch 1359/2000
6/6             4s 648ms/step - kl:
0.4369 - nll: -1.3839 - total_loss: -1.3662 - val_direction: 0.0028 - val_kl:
0.4373 - val_loss: -1.1721 - val_nll: -1.1910
Epoch 1360/2000
6/6             4s 644ms/step - kl:
0.4366 - nll: -1.3808 - total_loss: -1.3631 - val_direction: 0.0026 - val_kl:
0.4361 - val_loss: -1.1856 - val_nll: -1.2043
Epoch 1361/2000
6/6             4s 640ms/step - kl:
0.4350 - nll: -1.3831 - total_loss: -1.3656 - val_direction: 0.0026 - val_kl:
0.4349 - val_loss: -1.1873 - val_nll: -1.2060
Epoch 1362/2000
6/6             4s 651ms/step - kl:
0.4344 - nll: -1.3816 - total_loss: -1.3640 - val_direction: 0.0031 - val_kl:
0.4353 - val_loss: -1.1543 - val_nll: -1.1733
Epoch 1363/2000
6/6             4s 638ms/step - kl:
0.4352 - nll: -1.3803 - total_loss: -1.3626 - val_direction: 0.0030 - val_kl:
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0.4359 - val_loss: -1.1639 - val_nll: -1.1829
Epoch 1364/2000
6/6             4s 642ms/step - kl:
0.4350 - nll: -1.3788 - total_loss: -1.3612 - val_direction: 0.0025 - val_kl:
0.4356 - val_loss: -1.1899 - val_nll: -1.2086
Epoch 1365/2000
6/6             4s 638ms/step - kl:
0.4355 - nll: -1.3830 - total_loss: -1.3654 - val_direction: 0.0026 - val_kl:
0.4364 - val_loss: -1.1870 - val_nll: -1.2058
Epoch 1366/2000
6/6             5s 837ms/step - kl:
0.4365 - nll: -1.3807 - total_loss: -1.3631 - val_direction: 0.0029 - val_kl:
0.4372 - val_loss: -1.1680 - val_nll: -1.1869
Epoch 1367/2000
6/6             5s 761ms/step - kl:
0.4360 - nll: -1.3809 - total_loss: -1.3633 - val_direction: 0.0026 - val_kl:
0.4355 - val_loss: -1.1832 - val_nll: -1.2020
Epoch 1368/2000
6/6             4s 731ms/step - kl:
0.4355 - nll: -1.3797 - total_loss: -1.3620 - val_direction: 0.0029 - val_kl:
0.4365 - val_loss: -1.1667 - val_nll: -1.1856
Epoch 1369/2000
6/6             4s 689ms/step - kl:
0.4369 - nll: -1.3803 - total_loss: -1.3626 - val_direction: 0.0026 - val_kl:
0.4378 - val_loss: -1.1847 - val_nll: -1.2035
Epoch 1370/2000
6/6             4s 660ms/step - kl:
0.4372 - nll: -1.3829 - total_loss: -1.3652 - val_direction: 0.0027 - val_kl:
0.4378 - val_loss: -1.1799 - val_nll: -1.1988
Epoch 1371/2000
6/6             4s 644ms/step - kl:
0.4379 - nll: -1.3795 - total_loss: -1.3617 - val_direction: 0.0031 - val_kl:
0.4386 - val_loss: -1.1520 - val_nll: -1.1711
Epoch 1372/2000
6/6             4s 635ms/step - kl:
0.4378 - nll: -1.3783 - total_loss: -1.3606 - val_direction: 0.0027 - val_kl:
0.4370 - val_loss: -1.1752 - val_nll: -1.1940
Epoch 1373/2000
6/6             4s 637ms/step - kl:
0.4358 - nll: -1.3819 - total_loss: -1.3643 - val_direction: 0.0024 - val_kl:
0.4348 - val_loss: -1.1939 - val_nll: -1.2125
Epoch 1374/2000
6/6             4s 635ms/step - kl:
0.4340 - nll: -1.3819 - total_loss: -1.3644 - val_direction: 0.0027 - val_kl:
0.4350 - val_loss: -1.1763 - val_nll: -1.1951
Epoch 1375/2000
6/6             4s 637ms/step - kl:
0.4357 - nll: -1.3802 - total_loss: -1.3625 - val_direction: 0.0028 - val_kl:
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0.4381 - val_loss: -1.1702 - val_nll: -1.1892
Epoch 1376/2000
6/6            5s 852ms/step - kl:
0.4384 - nll: -1.3809 - total_loss: -1.3632 - val_direction: 0.0026 - val_kl:
0.4385 - val_loss: -1.1813 - val_nll: -1.2001
Epoch 1377/2000
6/6            5s 841ms/step - kl:
0.4369 - nll: -1.3824 - total_loss: -1.3648 - val_direction: 0.0027 - val_kl:
0.4359 - val_loss: -1.1798 - val_nll: -1.1986
Epoch 1378/2000
6/6            4s 687ms/step - kl:
0.4355 - nll: -1.3808 - total_loss: -1.3632 - val_direction: 0.0031 - val_kl:
0.4359 - val_loss: -1.1522 - val_nll: -1.1712
Epoch 1379/2000
6/6            4s 643ms/step - kl:
0.4350 - nll: -1.3797 - total_loss: -1.3621 - val_direction: 0.0024 - val_kl:
0.4344 - val_loss: -1.1998 - val_nll: -1.2184
Epoch 1380/2000
6/6            4s 653ms/step - kl:
0.4334 - nll: -1.3846 - total_loss: -1.3671 - val_direction: 0.0023 - val_kl:
0.4334 - val_loss: -1.2043 - val_nll: -1.2228
Epoch 1381/2000
6/6            4s 640ms/step - kl:
0.4336 - nll: -1.3820 - total_loss: -1.3645 - val_direction: 0.0031 - val_kl:
0.4349 - val_loss: -1.1557 - val_nll: -1.1747
Epoch 1382/2000
6/6            4s 633ms/step - kl:
0.4343 - nll: -1.3799 - total_loss: -1.3623 - val_direction: 0.0027 - val_kl:
0.4341 - val_loss: -1.1809 - val_nll: -1.1997
Epoch 1383/2000
6/6            4s 640ms/step - kl:
0.4331 - nll: -1.3819 - total_loss: -1.3644 - val_direction: 0.0026 - val_kl:
0.4331 - val_loss: -1.1804 - val_nll: -1.1991
Epoch 1384/2000
6/6            4s 660ms/step - kl:
0.4328 - nll: -1.3820 - total_loss: -1.3645 - val_direction: 0.0029 - val_kl:
0.4333 - val_loss: -1.1664 - val_nll: -1.1852
Epoch 1385/2000
6/6            4s 638ms/step - kl:
0.4330 - nll: -1.3822 - total_loss: -1.3647 - val_direction: 0.0025 - val_kl:
0.4343 - val_loss: -1.1895 - val_nll: -1.2081
Epoch 1386/2000
6/6            5s 777ms/step - kl:
0.4351 - nll: -1.3821 - total_loss: -1.3645 - val_direction: 0.0029 - val_kl:
0.4368 - val_loss: -1.1650 - val_nll: -1.1839
Epoch 1387/2000
6/6            5s 786ms/step - kl:
0.4362 - nll: -1.3799 - total_loss: -1.3623 - val_direction: 0.0031 - val_kl:
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0.4356 - val_loss: -1.1558 - val_nll: -1.1748
Epoch 1388/2000
6/6             4s 663ms/step - kl:
0.4351 - nll: -1.3790 - total_loss: -1.3614 - val_direction: 0.0027 - val_kl:
0.4350 - val_loss: -1.1788 - val_nll: -1.1975
Epoch 1389/2000
6/6             4s 669ms/step - kl:
0.4339 - nll: -1.3807 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4337 - val_loss: -1.1811 - val_nll: -1.1998
Epoch 1390/2000
6/6             4s 647ms/step - kl:
0.4338 - nll: -1.3821 - total_loss: -1.3645 - val_direction: 0.0027 - val_kl:
0.4344 - val_loss: -1.1792 - val_nll: -1.1980
Epoch 1391/2000
6/6             4s 663ms/step - kl:
0.4340 - nll: -1.3821 - total_loss: -1.3645 - val_direction: 0.0026 - val_kl:
0.4346 - val_loss: -1.1872 - val_nll: -1.2059
Epoch 1392/2000
6/6             4s 647ms/step - kl:
0.4351 - nll: -1.3827 - total_loss: -1.3651 - val_direction: 0.0025 - val_kl:
0.4367 - val_loss: -1.1891 - val_nll: -1.2078
Epoch 1393/2000
6/6             4s 640ms/step - kl:
0.4364 - nll: -1.3823 - total_loss: -1.3647 - val_direction: 0.0029 - val_kl:
0.4363 - val_loss: -1.1654 - val_nll: -1.1843
Epoch 1394/2000
6/6             4s 637ms/step - kl:
0.4348 - nll: -1.3800 - total_loss: -1.3625 - val_direction: 0.0029 - val_kl:
0.4326 - val_loss: -1.1692 - val_nll: -1.1879
Epoch 1395/2000
6/6             4s 637ms/step - kl:
0.4305 - nll: -1.3817 - total_loss: -1.3643 - val_direction: 0.0026 - val_kl:
0.4287 - val_loss: -1.1850 - val_nll: -1.2034
Epoch 1396/2000
6/6             4s 746ms/step - kl:
0.4284 - nll: -1.3819 - total_loss: -1.3645 - val_direction: 0.0030 - val_kl:
0.4301 - val_loss: -1.1607 - val_nll: -1.1794
Epoch 1397/2000
6/6             5s 811ms/step - kl:
0.4311 - nll: -1.3817 - total_loss: -1.3642 - val_direction: 0.0028 - val_kl:
0.4320 - val_loss: -1.1733 - val_nll: -1.1920
Epoch 1398/2000
6/6             5s 747ms/step - kl:
0.4301 - nll: -1.3804 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4286 - val_loss: -1.1778 - val_nll: -1.1963
Epoch 1399/2000
6/6             4s 744ms/step - kl:
0.4288 - nll: -1.3812 - total_loss: -1.3638 - val_direction: 0.0027 - val_kl:
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0.4312 - val_loss: -1.1814 - val_nll: -1.2000
Epoch 1400/2000
6/6             4s 641ms/step - kl:
0.4322 - nll: -1.3804 - total_loss: -1.3629 - val_direction: 0.0026 - val_kl:
0.4341 - val_loss: -1.1828 - val_nll: -1.2015
Epoch 1401/2000
6/6             4s 645ms/step - kl:
0.4347 - nll: -1.3829 - total_loss: -1.3652 - val_direction: 0.0027 - val_kl:
0.4366 - val_loss: -1.1822 - val_nll: -1.2010
Epoch 1402/2000
6/6             4s 635ms/step - kl:
0.4357 - nll: -1.3811 - total_loss: -1.3635 - val_direction: 0.0031 - val_kl:
0.4358 - val_loss: -1.1500 - val_nll: -1.1690
Epoch 1403/2000
6/6             4s 641ms/step - kl:
0.4347 - nll: -1.3807 - total_loss: -1.3631 - val_direction: 0.0028 - val_kl:
0.4331 - val_loss: -1.1740 - val_nll: -1.1927
Epoch 1404/2000
6/6             4s 633ms/step - kl:
0.4311 - nll: -1.3827 - total_loss: -1.3654 - val_direction: 0.0023 - val_kl:
0.4296 - val_loss: -1.1973 - val_nll: -1.2156
Epoch 1405/2000
6/6             4s 636ms/step - kl:
0.4295 - nll: -1.3839 - total_loss: -1.3665 - val_direction: 0.0028 - val_kl:
0.4308 - val_loss: -1.1738 - val_nll: -1.1924
Epoch 1406/2000
6/6             5s 789ms/step - kl:
0.4309 - nll: -1.3794 - total_loss: -1.3620 - val_direction: 0.0031 - val_kl:
0.4313 - val_loss: -1.1528 - val_nll: -1.1716
Epoch 1407/2000
6/6             4s 733ms/step - kl:
0.4300 - nll: -1.3786 - total_loss: -1.3612 - val_direction: 0.0026 - val_kl:
0.4292 - val_loss: -1.1840 - val_nll: -1.2025
Epoch 1408/2000
6/6             4s 715ms/step - kl:
0.4288 - nll: -1.3808 - total_loss: -1.3634 - val_direction: 0.0026 - val_kl:
0.4292 - val_loss: -1.1825 - val_nll: -1.2010
Epoch 1409/2000
6/6             4s 729ms/step - kl:
0.4288 - nll: -1.3831 - total_loss: -1.3657 - val_direction: 0.0023 - val_kl:
0.4303 - val_loss: -1.2028 - val_nll: -1.2212
Epoch 1410/2000
6/6             4s 648ms/step - kl:
0.4308 - nll: -1.3834 - total_loss: -1.3659 - val_direction: 0.0028 - val_kl:
0.4326 - val_loss: -1.1719 - val_nll: -1.1906
Epoch 1411/2000
6/6             4s 640ms/step - kl:
0.4327 - nll: -1.3795 - total_loss: -1.3619 - val_direction: 0.0028 - val_kl:
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0.4331 - val_loss: -1.1723 - val_nll: -1.1910
Epoch 1412/2000
6/6            4s 636ms/step - kl:
0.4318 - nll: -1.3819 - total_loss: -1.3645 - val_direction: 0.0027 - val_kl:
0.4310 - val_loss: -1.1816 - val_nll: -1.2001
Epoch 1413/2000
6/6            4s 644ms/step - kl:
0.4307 - nll: -1.3810 - total_loss: -1.3636 - val_direction: 0.0031 - val_kl:
0.4310 - val_loss: -1.1541 - val_nll: -1.1729
Epoch 1414/2000
6/6            4s 650ms/step - kl:
0.4301 - nll: -1.3790 - total_loss: -1.3615 - val_direction: 0.0028 - val_kl:
0.4290 - val_loss: -1.1736 - val_nll: -1.1921
Epoch 1415/2000
6/6            4s 637ms/step - kl:
0.4283 - nll: -1.3832 - total_loss: -1.3659 - val_direction: 0.0021 - val_kl:
0.4291 - val_loss: -1.2158 - val_nll: -1.2340
Epoch 1416/2000
6/6            4s 678ms/step - kl:
0.4299 - nll: -1.3823 - total_loss: -1.3649 - val_direction: 0.0029 - val_kl:
0.4328 - val_loss: -1.1620 - val_nll: -1.1808
Epoch 1417/2000
6/6            5s 778ms/step - kl:
0.4333 - nll: -1.3809 - total_loss: -1.3633 - val_direction: 0.0028 - val_kl:
0.4342 - val_loss: -1.1729 - val_nll: -1.1917
Epoch 1418/2000
6/6            4s 701ms/step - kl:
0.4330 - nll: -1.3819 - total_loss: -1.3644 - val_direction: 0.0026 - val_kl:
0.4314 - val_loss: -1.1820 - val_nll: -1.2006
Epoch 1419/2000
6/6            4s 717ms/step - kl:
0.4306 - nll: -1.3825 - total_loss: -1.3651 - val_direction: 0.0030 - val_kl:
0.4315 - val_loss: -1.1600 - val_nll: -1.1788
Epoch 1420/2000
6/6            4s 643ms/step - kl:
0.4308 - nll: -1.3792 - total_loss: -1.3617 - val_direction: 0.0026 - val_kl:
0.4303 - val_loss: -1.1837 - val_nll: -1.2023
Epoch 1421/2000
6/6            4s 673ms/step - kl:
0.4297 - nll: -1.3816 - total_loss: -1.3642 - val_direction: 0.0025 - val_kl:
0.4299 - val_loss: -1.1889 - val_nll: -1.2074
Epoch 1422/2000
6/6            4s 644ms/step - kl:
0.4299 - nll: -1.3823 - total_loss: -1.3649 - val_direction: 0.0028 - val_kl:
0.4305 - val_loss: -1.1727 - val_nll: -1.1913
Epoch 1423/2000
6/6            4s 638ms/step - kl:
0.4301 - nll: -1.3811 - total_loss: -1.3636 - val_direction: 0.0029 - val_kl:
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0.4304 - val_loss: -1.1693 - val_nll: -1.1879
Epoch 1424/2000
6/6             4s 635ms/step - kl:
0.4305 - nll: -1.3813 - total_loss: -1.3639 - val_direction: 0.0026 - val_kl:
0.4313 - val_loss: -1.1834 - val_nll: -1.2020
Epoch 1425/2000
6/6             4s 634ms/step - kl:
0.4307 - nll: -1.3809 - total_loss: -1.3635 - val_direction: 0.0029 - val_kl:
0.4300 - val_loss: -1.1705 - val_nll: -1.1891
Epoch 1426/2000
6/6             4s 637ms/step - kl:
0.4289 - nll: -1.3788 - total_loss: -1.3615 - val_direction: 0.0028 - val_kl:
0.4283 - val_loss: -1.1749 - val_nll: -1.1935
Epoch 1427/2000
6/6             4s 639ms/step - kl:
0.4279 - nll: -1.3821 - total_loss: -1.3648 - val_direction: 0.0024 - val_kl:
0.4281 - val_loss: -1.1986 - val_nll: -1.2169
Epoch 1428/2000
6/6             5s 840ms/step - kl:
0.4281 - nll: -1.3823 - total_loss: -1.3650 - val_direction: 0.0028 - val_kl:
0.4293 - val_loss: -1.1744 - val_nll: -1.1930
Epoch 1429/2000
6/6             4s 754ms/step - kl:
0.4291 - nll: -1.3796 - total_loss: -1.3622 - val_direction: 0.0029 - val_kl:
0.4302 - val_loss: -1.1730 - val_nll: -1.1916
Epoch 1430/2000
6/6             4s 718ms/step - kl:
0.4303 - nll: -1.3802 - total_loss: -1.3628 - val_direction: 0.0027 - val_kl:
0.4305 - val_loss: -1.1764 - val_nll: -1.1950
Epoch 1431/2000
6/6             4s 641ms/step - kl:
0.4293 - nll: -1.3822 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.4291 - val_loss: -1.1864 - val_nll: -1.2049
Epoch 1432/2000
6/6             4s 653ms/step - kl:
0.4292 - nll: -1.3832 - total_loss: -1.3658 - val_direction: 0.0028 - val_kl:
0.4304 - val_loss: -1.1696 - val_nll: -1.1883
Epoch 1433/2000
6/6             4s 644ms/step - kl:
0.4298 - nll: -1.3795 - total_loss: -1.3620 - val_direction: 0.0029 - val_kl:
0.4297 - val_loss: -1.1681 - val_nll: -1.1867
Epoch 1434/2000
6/6             4s 633ms/step - kl:
0.4288 - nll: -1.3818 - total_loss: -1.3645 - val_direction: 0.0024 - val_kl:
0.4274 - val_loss: -1.1962 - val_nll: -1.2145
Epoch 1435/2000
6/6             4s 635ms/step - kl:
0.4266 - nll: -1.3826 - total_loss: -1.3654 - val_direction: 0.0028 - val_kl:
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0.4267 - val_loss: -1.1730 - val_nll: -1.1914
Epoch 1436/2000
6/6            4s 651ms/step - kl:
0.4263 - nll: -1.3794 - total_loss: -1.3621 - val_direction: 0.0031 - val_kl:
0.4262 - val_loss: -1.1589 - val_nll: -1.1775
Epoch 1437/2000
6/6            4s 641ms/step - kl:
0.4254 - nll: -1.3806 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
0.4253 - val_loss: -1.1736 - val_nll: -1.1920
Epoch 1438/2000
6/6            4s 680ms/step - kl:
0.4253 - nll: -1.3817 - total_loss: -1.3644 - val_direction: 0.0028 - val_kl:
0.4266 - val_loss: -1.1750 - val_nll: -1.1935
Epoch 1439/2000
6/6            5s 769ms/step - kl:
0.4273 - nll: -1.3823 - total_loss: -1.3649 - val_direction: 0.0028 - val_kl:
0.4295 - val_loss: -1.1729 - val_nll: -1.1915
Epoch 1440/2000
6/6            4s 694ms/step - kl:
0.4292 - nll: -1.3790 - total_loss: -1.3616 - val_direction: 0.0029 - val_kl:
0.4292 - val_loss: -1.1686 - val_nll: -1.1872
Epoch 1441/2000
6/6            4s 712ms/step - kl:
0.4276 - nll: -1.3795 - total_loss: -1.3622 - val_direction: 0.0027 - val_kl:
0.4264 - val_loss: -1.1819 - val_nll: -1.2003
Epoch 1442/2000
6/6            4s 645ms/step - kl:
0.4260 - nll: -1.3830 - total_loss: -1.3658 - val_direction: 0.0023 - val_kl:
0.4272 - val_loss: -1.2005 - val_nll: -1.2187
Epoch 1443/2000
6/6            4s 657ms/step - kl:
0.4278 - nll: -1.3823 - total_loss: -1.3650 - val_direction: 0.0027 - val_kl:
0.4300 - val_loss: -1.1744 - val_nll: -1.1929
Epoch 1444/2000
6/6            4s 648ms/step - kl:
0.4304 - nll: -1.3814 - total_loss: -1.3639 - val_direction: 0.0031 - val_kl:
0.4328 - val_loss: -1.1542 - val_nll: -1.1731
Epoch 1445/2000
6/6            4s 633ms/step - kl:
0.4326 - nll: -1.3767 - total_loss: -1.3591 - val_direction: 0.0031 - val_kl:
0.4322 - val_loss: -1.1548 - val_nll: -1.1736
Epoch 1446/2000
6/6            4s 630ms/step - kl:
0.4301 - nll: -1.3820 - total_loss: -1.3647 - val_direction: 0.0022 - val_kl:
0.4274 - val_loss: -1.2112 - val_nll: -1.2293
Epoch 1447/2000
6/6            4s 636ms/step - kl:
0.4262 - nll: -1.3851 - total_loss: -1.3679 - val_direction: 0.0027 - val_kl:
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0.4267 - val_loss: -1.1726 - val_nll: -1.1910
Epoch 1448/2000
6/6            5s 818ms/step - kl:
0.4266 - nll: -1.3791 - total_loss: -1.3618 - val_direction: 0.0033 - val_kl:
0.4272 - val_loss: -1.1415 - val_nll: -1.1602
Epoch 1449/2000
6/6            5s 795ms/step - kl:
0.4260 - nll: -1.3821 - total_loss: -1.3649 - val_direction: 0.0023 - val_kl:
0.4254 - val_loss: -1.2038 - val_nll: -1.2220
Epoch 1450/2000
6/6            4s 713ms/step - kl:
0.4259 - nll: -1.3850 - total_loss: -1.3678 - val_direction: 0.0028 - val_kl:
0.4285 - val_loss: -1.1695 - val_nll: -1.1880
Epoch 1451/2000
6/6            4s 660ms/step - kl:
0.4297 - nll: -1.3811 - total_loss: -1.3637 - val_direction: 0.0031 - val_kl:
0.4317 - val_loss: -1.1578 - val_nll: -1.1766
Epoch 1452/2000
6/6            4s 643ms/step - kl:
0.4311 - nll: -1.3774 - total_loss: -1.3599 - val_direction: 0.0029 - val_kl:
0.4304 - val_loss: -1.1669 - val_nll: -1.1856
Epoch 1453/2000
6/6            4s 639ms/step - kl:
0.4286 - nll: -1.3812 - total_loss: -1.3639 - val_direction: 0.0026 - val_kl:
0.4271 - val_loss: -1.1850 - val_nll: -1.2034
Epoch 1454/2000
6/6            4s 635ms/step - kl:
0.4266 - nll: -1.3822 - total_loss: -1.3649 - val_direction: 0.0028 - val_kl:
0.4267 - val_loss: -1.1733 - val_nll: -1.1917
Epoch 1455/2000
6/6            4s 631ms/step - kl:
0.4268 - nll: -1.3818 - total_loss: -1.3645 - val_direction: 0.0026 - val_kl:
0.4277 - val_loss: -1.1848 - val_nll: -1.2032
Epoch 1456/2000
6/6            4s 636ms/step - kl:
0.4274 - nll: -1.3827 - total_loss: -1.3654 - val_direction: 0.0025 - val_kl:
0.4283 - val_loss: -1.1942 - val_nll: -1.2125
Epoch 1457/2000
6/6            4s 639ms/step - kl:
0.4280 - nll: -1.3827 - total_loss: -1.3654 - val_direction: 0.0027 - val_kl:
0.4284 - val_loss: -1.1800 - val_nll: -1.1984
Epoch 1458/2000
6/6            5s 835ms/step - kl:
0.4270 - nll: -1.3779 - total_loss: -1.3606 - val_direction: 0.0030 - val_kl:
0.4256 - val_loss: -1.1618 - val_nll: -1.1804
Epoch 1459/2000
6/6            5s 837ms/step - kl:
0.4236 - nll: -1.3820 - total_loss: -1.3650 - val_direction: 0.0021 - val_kl:
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0.4218 - val_loss: -1.2121 - val_nll: -1.2300
Epoch 1460/2000
6/6             4s 657ms/step - kl:
0.4214 - nll: -1.3855 - total_loss: -1.3685 - val_direction: 0.0023 - val_kl:
0.4227 - val_loss: -1.1948 - val_nll: -1.2129
Epoch 1461/2000
6/6             4s 689ms/step - kl:
0.4239 - nll: -1.3832 - total_loss: -1.3660 - val_direction: 0.0031 - val_kl:
0.4275 - val_loss: -1.1553 - val_nll: -1.1740
Epoch 1462/2000
6/6             4s 644ms/step - kl:
0.4287 - nll: -1.3781 - total_loss: -1.3606 - val_direction: 0.0030 - val_kl:
0.4297 - val_loss: -1.1611 - val_nll: -1.1798
Epoch 1463/2000
6/6             4s 638ms/step - kl:
0.4282 - nll: -1.3798 - total_loss: -1.3625 - val_direction: 0.0026 - val_kl:
0.4260 - val_loss: -1.1850 - val_nll: -1.2033
Epoch 1464/2000
6/6             4s 635ms/step - kl:
0.4236 - nll: -1.3830 - total_loss: -1.3659 - val_direction: 0.0027 - val_kl:
0.4220 - val_loss: -1.1762 - val_nll: -1.1944
Epoch 1465/2000
6/6             4s 633ms/step - kl:
0.4215 - nll: -1.3808 - total_loss: -1.3637 - val_direction: 0.0027 - val_kl:
0.4222 - val_loss: -1.1793 - val_nll: -1.1975
Epoch 1466/2000
6/6             4s 658ms/step - kl:
0.4226 - nll: -1.3825 - total_loss: -1.3654 - val_direction: 0.0025 - val_kl:
0.4246 - val_loss: -1.1932 - val_nll: -1.2114
Epoch 1467/2000
6/6             4s 777ms/step - kl:
0.4248 - nll: -1.3831 - total_loss: -1.3659 - val_direction: 0.0025 - val_kl:
0.4260 - val_loss: -1.1869 - val_nll: -1.2052
Epoch 1468/2000
6/6             5s 817ms/step - kl:
0.4261 - nll: -1.3822 - total_loss: -1.3650 - val_direction: 0.0025 - val_kl:
0.4264 - val_loss: -1.1911 - val_nll: -1.2094
Epoch 1469/2000
6/6             4s 651ms/step - kl:
0.4263 - nll: -1.3814 - total_loss: -1.3641 - val_direction: 0.0029 - val_kl:
0.4276 - val_loss: -1.1678 - val_nll: -1.1864
Epoch 1470/2000
6/6             4s 679ms/step - kl:
0.4280 - nll: -1.3812 - total_loss: -1.3639 - val_direction: 0.0032 - val_kl:
0.4278 - val_loss: -1.1486 - val_nll: -1.1673
Epoch 1471/2000
6/6             4s 644ms/step - kl:
0.4254 - nll: -1.3772 - total_loss: -1.3600 - val_direction: 0.0027 - val_kl:
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0.4227 - val_loss: -1.1813 - val_nll: -1.1995
Epoch 1472/2000
6/6             4s 643ms/step - kl:
0.4213 - nll: -1.3845 - total_loss: -1.3675 - val_direction: 0.0020 - val_kl:
0.4208 - val_loss: -1.2153 - val_nll: -1.2332
Epoch 1473/2000
6/6             4s 657ms/step - kl:
0.4208 - nll: -1.3834 - total_loss: -1.3664 - val_direction: 0.0029 - val_kl:
0.4218 - val_loss: -1.1632 - val_nll: -1.1816
Epoch 1474/2000
6/6             4s 638ms/step - kl:
0.4220 - nll: -1.3802 - total_loss: -1.3630 - val_direction: 0.0031 - val_kl:
0.4232 - val_loss: -1.1583 - val_nll: -1.1767
Epoch 1475/2000
6/6             4s 632ms/step - kl:
0.4235 - nll: -1.3786 - total_loss: -1.3614 - val_direction: 0.0028 - val_kl:
0.4249 - val_loss: -1.1729 - val_nll: -1.1913
Epoch 1476/2000
6/6             4s 629ms/step - kl:
0.4251 - nll: -1.3824 - total_loss: -1.3652 - val_direction: 0.0025 - val_kl:
0.4265 - val_loss: -1.1946 - val_nll: -1.2128
Epoch 1477/2000
6/6             5s 832ms/step - kl:
0.4268 - nll: -1.3825 - total_loss: -1.3652 - val_direction: 0.0029 - val_kl:
0.4283 - val_loss: -1.1632 - val_nll: -1.1818
Epoch 1478/2000
6/6             4s 739ms/step - kl:
0.4274 - nll: -1.3810 - total_loss: -1.3638 - val_direction: 0.0026 - val_kl:
0.4260 - val_loss: -1.1835 - val_nll: -1.2019
Epoch 1479/2000
6/6             4s 716ms/step - kl:
0.4241 - nll: -1.3817 - total_loss: -1.3646 - val_direction: 0.0025 - val_kl:
0.4223 - val_loss: -1.1918 - val_nll: -1.2099
Epoch 1480/2000
6/6             4s 655ms/step - kl:
0.4214 - nll: -1.3838 - total_loss: -1.3668 - val_direction: 0.0026 - val_kl:
0.4216 - val_loss: -1.1835 - val_nll: -1.2016
Epoch 1481/2000
6/6             4s 661ms/step - kl:
0.4215 - nll: -1.3808 - total_loss: -1.3637 - val_direction: 0.0030 - val_kl:
0.4222 - val_loss: -1.1588 - val_nll: -1.1772
Epoch 1482/2000
6/6             4s 640ms/step - kl:
0.4217 - nll: -1.3790 - total_loss: -1.3619 - val_direction: 0.0028 - val_kl:
0.4218 - val_loss: -1.1716 - val_nll: -1.1899
Epoch 1483/2000
6/6             4s 639ms/step - kl:
0.4216 - nll: -1.3822 - total_loss: -1.3651 - val_direction: 0.0026 - val_kl:
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0.4228 - val_loss: -1.1853 - val_nll: -1.2035
Epoch 1484/2000
6/6             4s 639ms/step - kl:
0.4230 - nll: -1.3798 - total_loss: -1.3627 - val_direction: 0.0031 - val_kl:
0.4243 - val_loss: -1.1575 - val_nll: -1.1760
Epoch 1485/2000
6/6             4s 633ms/step - kl:
0.4242 - nll: -1.3785 - total_loss: -1.3613 - val_direction: 0.0029 - val_kl:
0.4247 - val_loss: -1.1711 - val_nll: -1.1895
Epoch 1486/2000
6/6             4s 672ms/step - kl:
0.4233 - nll: -1.3824 - total_loss: -1.3653 - val_direction: 0.0025 - val_kl:
0.4223 - val_loss: -1.1891 - val_nll: -1.2072
Epoch 1487/2000
6/6             5s 828ms/step - kl:
0.4217 - nll: -1.3834 - total_loss: -1.3664 - val_direction: 0.0027 - val_kl:
0.4221 - val_loss: -1.1797 - val_nll: -1.1979
Epoch 1488/2000
6/6             4s 693ms/step - kl:
0.4222 - nll: -1.3794 - total_loss: -1.3623 - val_direction: 0.0029 - val_kl:
0.4236 - val_loss: -1.1654 - val_nll: -1.1838
Epoch 1489/2000
6/6             4s 688ms/step - kl:
0.4233 - nll: -1.3816 - total_loss: -1.3645 - val_direction: 0.0027 - val_kl:
0.4232 - val_loss: -1.1804 - val_nll: -1.1986
Epoch 1490/2000
6/6             4s 641ms/step - kl:
0.4226 - nll: -1.3831 - total_loss: -1.3660 - val_direction: 0.0024 - val_kl:
0.4224 - val_loss: -1.1952 - val_nll: -1.2133
Epoch 1491/2000
6/6             4s 648ms/step - kl:
0.4227 - nll: -1.3827 - total_loss: -1.3655 - val_direction: 0.0028 - val_kl:
0.4243 - val_loss: -1.1698 - val_nll: -1.1882
Epoch 1492/2000
6/6             4s 639ms/step - kl:
0.4245 - nll: -1.3823 - total_loss: -1.3651 - val_direction: 0.0029 - val_kl:
0.4263 - val_loss: -1.1681 - val_nll: -1.1866
Epoch 1493/2000
6/6             4s 693ms/step - kl:
0.4258 - nll: -1.3792 - total_loss: -1.3620 - val_direction: 0.0032 - val_kl:
0.4247 - val_loss: -1.1501 - val_nll: -1.1687
Epoch 1494/2000
6/6             4s 710ms/step - kl:
0.4229 - nll: -1.3808 - total_loss: -1.3637 - val_direction: 0.0026 - val_kl:
0.4214 - val_loss: -1.1859 - val_nll: -1.2040
Epoch 1495/2000
6/6             4s 654ms/step - kl:
0.4205 - nll: -1.3813 - total_loss: -1.3643 - val_direction: 0.0026 - val_kl:
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0.4211 - val_loss: -1.1812 - val_nll: -1.1993
Epoch 1496/2000
6/6            4s 729ms/step - kl:
0.4213 - nll: -1.3814 - total_loss: -1.3644 - val_direction: 0.0026 - val_kl:
0.4221 - val_loss: -1.1851 - val_nll: -1.2033
Epoch 1497/2000
6/6            5s 831ms/step - kl:
0.4218 - nll: -1.3812 - total_loss: -1.3641 - val_direction: 0.0028 - val_kl:
0.4235 - val_loss: -1.1741 - val_nll: -1.1924
Epoch 1498/2000
6/6            4s 724ms/step - kl:
0.4241 - nll: -1.3795 - total_loss: -1.3623 - val_direction: 0.0029 - val_kl:
0.4252 - val_loss: -1.1707 - val_nll: -1.1891
Epoch 1499/2000
6/6            4s 736ms/step - kl:
0.4240 - nll: -1.3833 - total_loss: -1.3662 - val_direction: 0.0024 - val_kl:
0.4230 - val_loss: -1.1989 - val_nll: -1.2170
Epoch 1500/2000
6/6            4s 642ms/step - kl:
0.4218 - nll: -1.3824 - total_loss: -1.3654 - val_direction: 0.0028 - val_kl:
0.4209 - val_loss: -1.1743 - val_nll: -1.1925
Epoch 1501/2000
6/6            4s 654ms/step - kl:
0.4199 - nll: -1.3812 - total_loss: -1.3642 - val_direction: 0.0026 - val_kl:
0.4190 - val_loss: -1.1854 - val_nll: -1.2035
Epoch 1502/2000
6/6            4s 647ms/step - kl:
0.4181 - nll: -1.3813 - total_loss: -1.3644 - val_direction: 0.0028 - val_kl:
0.4184 - val_loss: -1.1714 - val_nll: -1.1896
Epoch 1503/2000
6/6            4s 653ms/step - kl:
0.4187 - nll: -1.3810 - total_loss: -1.3640 - val_direction: 0.0029 - val_kl:
0.4211 - val_loss: -1.1689 - val_nll: -1.1872
Epoch 1504/2000
6/6            4s 641ms/step - kl:
0.4219 - nll: -1.3806 - total_loss: -1.3634 - val_direction: 0.0029 - val_kl:
0.4239 - val_loss: -1.1708 - val_nll: -1.1892
Epoch 1505/2000
6/6            4s 629ms/step - kl:
0.4235 - nll: -1.3804 - total_loss: -1.3633 - val_direction: 0.0029 - val_kl:
0.4230 - val_loss: -1.1676 - val_nll: -1.1859
Epoch 1506/2000
6/6            4s 641ms/step - kl:
0.4218 - nll: -1.3801 - total_loss: -1.3630 - val_direction: 0.0026 - val_kl:
0.4207 - val_loss: -1.1839 - val_nll: -1.2020
Epoch 1507/2000
6/6            5s 794ms/step - kl:
0.4196 - nll: -1.3821 - total_loss: -1.3651 - val_direction: 0.0028 - val_kl:
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0.4202 - val_loss: -1.1754 - val_nll: -1.1936
Epoch 1508/2000
6/6             4s 736ms/step - kl:
0.4200 - nll: -1.3801 - total_loss: -1.3631 - val_direction: 0.0027 - val_kl:
0.4205 - val_loss: -1.1829 - val_nll: -1.2011
Epoch 1509/2000
6/6             4s 723ms/step - kl:
0.4203 - nll: -1.3822 - total_loss: -1.3652 - val_direction: 0.0028 - val_kl:
0.4217 - val_loss: -1.1752 - val_nll: -1.1935
Epoch 1510/2000
6/6             4s 680ms/step - kl:
0.4222 - nll: -1.3797 - total_loss: -1.3625 - val_direction: 0.0031 - val_kl:
0.4237 - val_loss: -1.1576 - val_nll: -1.1760
Epoch 1511/2000
6/6             4s 648ms/step - kl:
0.4228 - nll: -1.3807 - total_loss: -1.3636 - val_direction: 0.0025 - val_kl:
0.4223 - val_loss: -1.1929 - val_nll: -1.2110
Epoch 1512/2000
6/6             4s 677ms/step - kl:
0.4213 - nll: -1.3842 - total_loss: -1.3672 - val_direction: 0.0025 - val_kl:
0.4211 - val_loss: -1.1865 - val_nll: -1.2046
Epoch 1513/2000
6/6             4s 642ms/step - kl:
0.4204 - nll: -1.3816 - total_loss: -1.3646 - val_direction: 0.0031 - val_kl:
0.4211 - val_loss: -1.1554 - val_nll: -1.1738
Epoch 1514/2000
6/6             4s 668ms/step - kl:
0.4205 - nll: -1.3791 - total_loss: -1.3621 - val_direction: 0.0027 - val_kl:
0.4204 - val_loss: -1.1811 - val_nll: -1.1993
Epoch 1515/2000
6/6             4s 629ms/step - kl:
0.4208 - nll: -1.3816 - total_loss: -1.3645 - val_direction: 0.0029 - val_kl:
0.4227 - val_loss: -1.1673 - val_nll: -1.1856
Epoch 1516/2000
6/6             4s 641ms/step - kl:
0.4228 - nll: -1.3809 - total_loss: -1.3637 - val_direction: 0.0028 - val_kl:
0.4236 - val_loss: -1.1731 - val_nll: -1.1915
Epoch 1517/2000
6/6             5s 864ms/step - kl:
0.4221 - nll: -1.3809 - total_loss: -1.3638 - val_direction: 0.0025 - val_kl:
0.4200 - val_loss: -1.1916 - val_nll: -1.2097
Epoch 1518/2000
6/6             5s 742ms/step - kl:
0.4184 - nll: -1.3817 - total_loss: -1.3648 - val_direction: 0.0028 - val_kl:
0.4177 - val_loss: -1.1751 - val_nll: -1.1932
Epoch 1519/2000
6/6             4s 731ms/step - kl:
0.4174 - nll: -1.3804 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
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0.4186 - val_loss: -1.1716 - val_nll: -1.1897
Epoch 1520/2000
6/6            4s 639ms/step - kl:
0.4189 - nll: -1.3788 - total_loss: -1.3618 - val_direction: 0.0028 - val_kl:
0.4212 - val_loss: -1.1767 - val_nll: -1.1949
Epoch 1521/2000
6/6            4s 644ms/step - kl:
0.4225 - nll: -1.3825 - total_loss: -1.3654 - val_direction: 0.0026 - val_kl:
0.4248 - val_loss: -1.1868 - val_nll: -1.2051
Epoch 1522/2000
6/6            4s 644ms/step - kl:
0.4242 - nll: -1.3822 - total_loss: -1.3651 - val_direction: 0.0029 - val_kl:
0.4229 - val_loss: -1.1648 - val_nll: -1.1832
Epoch 1523/2000
6/6            4s 632ms/step - kl:
0.4206 - nll: -1.3794 - total_loss: -1.3624 - val_direction: 0.0029 - val_kl:
0.4181 - val_loss: -1.1728 - val_nll: -1.1910
Epoch 1524/2000
6/6            4s 631ms/step - kl:
0.4163 - nll: -1.3813 - total_loss: -1.3645 - val_direction: 0.0026 - val_kl:
0.4160 - val_loss: -1.1853 - val_nll: -1.2032
Epoch 1525/2000
6/6            4s 660ms/step - kl:
0.4163 - nll: -1.3810 - total_loss: -1.3641 - val_direction: 0.0028 - val_kl:
0.4183 - val_loss: -1.1707 - val_nll: -1.1889
Epoch 1526/2000
6/6            4s 633ms/step - kl:
0.4188 - nll: -1.3824 - total_loss: -1.3654 - val_direction: 0.0027 - val_kl:
0.4201 - val_loss: -1.1821 - val_nll: -1.2003
Epoch 1527/2000
6/6            5s 820ms/step - kl:
0.4193 - nll: -1.3815 - total_loss: -1.3646 - val_direction: 0.0023 - val_kl:
0.4191 - val_loss: -1.2009 - val_nll: -1.2188
Epoch 1528/2000
6/6            4s 723ms/step - kl:
0.4186 - nll: -1.3852 - total_loss: -1.3683 - val_direction: 0.0024 - val_kl:
0.4184 - val_loss: -1.1964 - val_nll: -1.2143
Epoch 1529/2000
6/6            4s 719ms/step - kl:
0.4186 - nll: -1.3818 - total_loss: -1.3649 - val_direction: 0.0030 - val_kl:
0.4198 - val_loss: -1.1628 - val_nll: -1.1811
Epoch 1530/2000
6/6            4s 639ms/step - kl:
0.4190 - nll: -1.3790 - total_loss: -1.3620 - val_direction: 0.0028 - val_kl:
0.4188 - val_loss: -1.1745 - val_nll: -1.1926
Epoch 1531/2000
6/6            4s 648ms/step - kl:
0.4181 - nll: -1.3813 - total_loss: -1.3644 - val_direction: 0.0024 - val_kl:
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0.4172 - val_loss: -1.1935 - val_nll: -1.2114
Epoch 1532/2000
6/6             4s 656ms/step - kl:
0.4159 - nll: -1.3828 - total_loss: -1.3660 - val_direction: 0.0025 - val_kl:
0.4152 - val_loss: -1.1921 - val_nll: -1.2100
Epoch 1533/2000
6/6             4s 717ms/step - kl:
0.4147 - nll: -1.3826 - total_loss: -1.3658 - val_direction: 0.0028 - val_kl:
0.4155 - val_loss: -1.1744 - val_nll: -1.1924
Epoch 1534/2000
6/6             4s 706ms/step - kl:
0.4160 - nll: -1.3803 - total_loss: -1.3634 - val_direction: 0.0029 - val_kl:
0.4185 - val_loss: -1.1673 - val_nll: -1.1855
Epoch 1535/2000
6/6             4s 629ms/step - kl:
0.4187 - nll: -1.3801 - total_loss: -1.3631 - val_direction: 0.0026 - val_kl:
0.4189 - val_loss: -1.1868 - val_nll: -1.2049
Epoch 1536/2000
6/6             4s 640ms/step - kl:
0.4177 - nll: -1.3825 - total_loss: -1.3656 - val_direction: 0.0025 - val_kl:
0.4166 - val_loss: -1.1924 - val_nll: -1.2103
Epoch 1537/2000
6/6             5s 795ms/step - kl:
0.4157 - nll: -1.3813 - total_loss: -1.3645 - val_direction: 0.0033 - val_kl:
0.4160 - val_loss: -1.1447 - val_nll: -1.1630
Epoch 1538/2000
6/6             4s 719ms/step - kl:
0.4153 - nll: -1.3759 - total_loss: -1.3590 - val_direction: 0.0032 - val_kl:
0.4146 - val_loss: -1.1556 - val_nll: -1.1738
Epoch 1539/2000
6/6             4s 764ms/step - kl:
0.4132 - nll: -1.3826 - total_loss: -1.3658 - val_direction: 0.0021 - val_kl:
0.4128 - val_loss: -1.2157 - val_nll: -1.2332
Epoch 1540/2000
6/6             4s 661ms/step - kl:
0.4140 - nll: -1.3845 - total_loss: -1.3677 - val_direction: 0.0026 - val_kl:
0.4178 - val_loss: -1.1843 - val_nll: -1.2023
Epoch 1541/2000
6/6             4s 642ms/step - kl:
0.4192 - nll: -1.3800 - total_loss: -1.3629 - val_direction: 0.0032 - val_kl:
0.4216 - val_loss: -1.1504 - val_nll: -1.1689
Epoch 1542/2000
6/6             4s 642ms/step - kl:
0.4211 - nll: -1.3794 - total_loss: -1.3624 - val_direction: 0.0024 - val_kl:
0.4202 - val_loss: -1.1964 - val_nll: -1.2144
Epoch 1543/2000
6/6             5s 810ms/step - kl:
0.4191 - nll: -1.3833 - total_loss: -1.3663 - val_direction: 0.0026 - val_kl:
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0.4185 - val_loss: -1.1836 - val_nll: -1.2016
Epoch 1544/2000
6/6             4s 644ms/step - kl:
0.4182 - nll: -1.3816 - total_loss: -1.3646 - val_direction: 0.0027 - val_kl:
0.4181 - val_loss: -1.1813 - val_nll: -1.1993
Epoch 1545/2000
6/6             4s 685ms/step - kl:
0.4174 - nll: -1.3807 - total_loss: -1.3638 - val_direction: 0.0028 - val_kl:
0.4175 - val_loss: -1.1735 - val_nll: -1.1916
Epoch 1546/2000
6/6             4s 636ms/step - kl:
0.4170 - nll: -1.3809 - total_loss: -1.3640 - val_direction: 0.0026 - val_kl:
0.4172 - val_loss: -1.1874 - val_nll: -1.2054
Epoch 1547/2000
6/6             5s 796ms/step - kl:
0.4170 - nll: -1.3825 - total_loss: -1.3656 - val_direction: 0.0026 - val_kl:
0.4185 - val_loss: -1.1855 - val_nll: -1.2035
Epoch 1548/2000
6/6             4s 717ms/step - kl:
0.4188 - nll: -1.3814 - total_loss: -1.3644 - val_direction: 0.0028 - val_kl:
0.4194 - val_loss: -1.1688 - val_nll: -1.1870
Epoch 1549/2000
6/6             4s 752ms/step - kl:
0.4189 - nll: -1.3795 - total_loss: -1.3626 - val_direction: 0.0028 - val_kl:
0.4187 - val_loss: -1.1746 - val_nll: -1.1927
Epoch 1550/2000
6/6             4s 643ms/step - kl:
0.4176 - nll: -1.3828 - total_loss: -1.3660 - val_direction: 0.0023 - val_kl:
0.4170 - val_loss: -1.2020 - val_nll: -1.2199
Epoch 1551/2000
6/6             4s 644ms/step - kl:
0.4164 - nll: -1.3824 - total_loss: -1.3656 - val_direction: 0.0027 - val_kl:
0.4171 - val_loss: -1.1751 - val_nll: -1.1931
Epoch 1552/2000
6/6             4s 637ms/step - kl:
0.4166 - nll: -1.3811 - total_loss: -1.3643 - val_direction: 0.0030 - val_kl:
0.4167 - val_loss: -1.1665 - val_nll: -1.1846
Epoch 1553/2000
6/6             4s 725ms/step - kl:
0.4153 - nll: -1.3794 - total_loss: -1.3626 - val_direction: 0.0028 - val_kl:
0.4142 - val_loss: -1.1737 - val_nll: -1.1916
Epoch 1554/2000
6/6             4s 737ms/step - kl:
0.4143 - nll: -1.3829 - total_loss: -1.3661 - val_direction: 0.0024 - val_kl:
0.4156 - val_loss: -1.1933 - val_nll: -1.2112
Epoch 1555/2000
6/6             4s 634ms/step - kl:
0.4155 - nll: -1.3823 - total_loss: -1.3655 - val_direction: 0.0029 - val_kl:
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0.4158 - val_loss: -1.1690 - val_nll: -1.1870
Epoch 1556/2000
6/6            4s 628ms/step - kl:
0.4151 - nll: -1.3802 - total_loss: -1.3634 - val_direction: 0.0027 - val_kl:
0.4147 - val_loss: -1.1828 - val_nll: -1.2007
Epoch 1557/2000
6/6            5s 778ms/step - kl:
0.4137 - nll: -1.3805 - total_loss: -1.3638 - val_direction: 0.0028 - val_kl:
0.4146 - val_loss: -1.1723 - val_nll: -1.1903
Epoch 1558/2000
6/6            4s 721ms/step - kl:
0.4150 - nll: -1.3803 - total_loss: -1.3634 - val_direction: 0.0028 - val_kl:
0.4166 - val_loss: -1.1714 - val_nll: -1.1895
Epoch 1559/2000
6/6            4s 715ms/step - kl:
0.4163 - nll: -1.3815 - total_loss: -1.3647 - val_direction: 0.0027 - val_kl:
0.4165 - val_loss: -1.1773 - val_nll: -1.1953
Epoch 1560/2000
6/6            4s 645ms/step - kl:
0.4158 - nll: -1.3808 - total_loss: -1.3639 - val_direction: 0.0029 - val_kl:
0.4166 - val_loss: -1.1708 - val_nll: -1.1889
Epoch 1561/2000
6/6            4s 650ms/step - kl:
0.4168 - nll: -1.3805 - total_loss: -1.3636 - val_direction: 0.0027 - val_kl:
0.4180 - val_loss: -1.1813 - val_nll: -1.1994
Epoch 1562/2000
6/6            4s 660ms/step - kl:
0.4175 - nll: -1.3816 - total_loss: -1.3647 - val_direction: 0.0027 - val_kl:
0.4177 - val_loss: -1.1789 - val_nll: -1.1969
Epoch 1563/2000
6/6            4s 634ms/step - kl:
0.4169 - nll: -1.3794 - total_loss: -1.3625 - val_direction: 0.0028 - val_kl:
0.4167 - val_loss: -1.1769 - val_nll: -1.1949
Epoch 1564/2000
6/6            4s 710ms/step - kl:
0.4157 - nll: -1.3832 - total_loss: -1.3664 - val_direction: 0.0025 - val_kl:
0.4154 - val_loss: -1.1918 - val_nll: -1.2096
Epoch 1565/2000
6/6            4s 630ms/step - kl:
0.4150 - nll: -1.3820 - total_loss: -1.3652 - val_direction: 0.0028 - val_kl:
0.4152 - val_loss: -1.1727 - val_nll: -1.1907
Epoch 1566/2000
6/6            4s 669ms/step - kl:
0.4158 - nll: -1.3817 - total_loss: -1.3649 - val_direction: 0.0029 - val_kl:
0.4172 - val_loss: -1.1699 - val_nll: -1.1880
Epoch 1567/2000
6/6            4s 740ms/step - kl:
0.4170 - nll: -1.3808 - total_loss: -1.3639 - val_direction: 0.0028 - val_kl:
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0.4179 - val_loss: -1.1750 - val_nll: -1.1931
Epoch 1568/2000
6/6             4s 665ms/step - kl:
0.4171 - nll: -1.3824 - total_loss: -1.3655 - val_direction: 0.0029 - val_kl:
0.4163 - val_loss: -1.1676 - val_nll: -1.1857
Epoch 1569/2000
6/6             5s 763ms/step - kl:
0.4150 - nll: -1.3801 - total_loss: -1.3633 - val_direction: 0.0025 - val_kl:
0.4139 - val_loss: -1.1914 - val_nll: -1.2092
Epoch 1570/2000
6/6             4s 644ms/step - kl:
0.4126 - nll: -1.3835 - total_loss: -1.3669 - val_direction: 0.0026 - val_kl:
0.4119 - val_loss: -1.1853 - val_nll: -1.2031
Epoch 1571/2000
6/6             4s 639ms/step - kl:
0.4123 - nll: -1.3824 - total_loss: -1.3657 - val_direction: 0.0031 - val_kl:
0.4148 - val_loss: -1.1559 - val_nll: -1.1740
Epoch 1572/2000
6/6             4s 644ms/step - kl:
0.4152 - nll: -1.3779 - total_loss: -1.3610 - val_direction: 0.0027 - val_kl:
0.4154 - val_loss: -1.1783 - val_nll: -1.1963
Epoch 1573/2000
6/6             4s 634ms/step - kl:
0.4139 - nll: -1.3837 - total_loss: -1.3670 - val_direction: 0.0021 - val_kl:
0.4131 - val_loss: -1.2147 - val_nll: -1.2322
Epoch 1574/2000
6/6             4s 662ms/step - kl:
0.4126 - nll: -1.3855 - total_loss: -1.3688 - val_direction: 0.0027 - val_kl:
0.4137 - val_loss: -1.1794 - val_nll: -1.1973
Epoch 1575/2000
6/6             4s 635ms/step - kl:
0.4141 - nll: -1.3800 - total_loss: -1.3632 - val_direction: 0.0031 - val_kl:
0.4152 - val_loss: -1.1553 - val_nll: -1.1734
Epoch 1576/2000
6/6             5s 801ms/step - kl:
0.4144 - nll: -1.3785 - total_loss: -1.3616 - val_direction: 0.0028 - val_kl:
0.4141 - val_loss: -1.1733 - val_nll: -1.1913
Epoch 1577/2000
6/6             5s 748ms/step - kl:
0.4125 - nll: -1.3826 - total_loss: -1.3660 - val_direction: 0.0024 - val_kl:
0.4116 - val_loss: -1.1964 - val_nll: -1.2141
Epoch 1578/2000
6/6             4s 690ms/step - kl:
0.4118 - nll: -1.3828 - total_loss: -1.3661 - val_direction: 0.0027 - val_kl:
0.4141 - val_loss: -1.1784 - val_nll: -1.1963
Epoch 1579/2000
6/6             4s 644ms/step - kl:
0.4159 - nll: -1.3816 - total_loss: -1.3647 - val_direction: 0.0028 - val_kl:
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0.4195 - val_loss: -1.1761 - val_nll: -1.1942
Epoch 1580/2000
6/6            4s 642ms/step - kl:
0.4199 - nll: -1.3813 - total_loss: -1.3643 - val_direction: 0.0029 - val_kl:
0.4210 - val_loss: -1.1691 - val_nll: -1.1873
Epoch 1581/2000
6/6            4s 641ms/step - kl:
0.4196 - nll: -1.3790 - total_loss: -1.3621 - val_direction: 0.0029 - val_kl:
0.4174 - val_loss: -1.1672 - val_nll: -1.1853
Epoch 1582/2000
6/6            4s 633ms/step - kl:
0.4144 - nll: -1.3811 - total_loss: -1.3644 - val_direction: 0.0026 - val_kl:
0.4105 - val_loss: -1.1860 - val_nll: -1.2037
Epoch 1583/2000
6/6            4s 631ms/step - kl:
0.4088 - nll: -1.3830 - total_loss: -1.3665 - val_direction: 0.0024 - val_kl:
0.4079 - val_loss: -1.1987 - val_nll: -1.2162
Epoch 1584/2000
6/6            4s 656ms/step - kl:
0.4076 - nll: -1.3825 - total_loss: -1.3660 - val_direction: 0.0027 - val_kl:
0.4089 - val_loss: -1.1786 - val_nll: -1.1963
Epoch 1585/2000
6/6            4s 643ms/step - kl:
0.4093 - nll: -1.3829 - total_loss: -1.3662 - val_direction: 0.0025 - val_kl:
0.4113 - val_loss: -1.1947 - val_nll: -1.2123
Epoch 1586/2000
6/6            5s 753ms/step - kl:
0.4120 - nll: -1.3800 - total_loss: -1.3633 - val_direction: 0.0029 - val_kl:
0.4137 - val_loss: -1.1643 - val_nll: -1.1823
Epoch 1587/2000
6/6            4s 679ms/step - kl:
0.4129 - nll: -1.3767 - total_loss: -1.3599 - val_direction: 0.0030 - val_kl:
0.4115 - val_loss: -1.1630 - val_nll: -1.1809
Epoch 1588/2000
6/6            4s 715ms/step - kl:
0.4097 - nll: -1.3833 - total_loss: -1.3668 - val_direction: 0.0022 - val_kl:
0.4092 - val_loss: -1.2071 - val_nll: -1.2246
Epoch 1589/2000
6/6            4s 642ms/step - kl:
0.4097 - nll: -1.3818 - total_loss: -1.3652 - val_direction: 0.0028 - val_kl:
0.4115 - val_loss: -1.1715 - val_nll: -1.1894
Epoch 1590/2000
6/6            4s 643ms/step - kl:
0.4115 - nll: -1.3806 - total_loss: -1.3639 - val_direction: 0.0026 - val_kl:
0.4125 - val_loss: -1.1851 - val_nll: -1.2029
Epoch 1591/2000
6/6            4s 648ms/step - kl:
0.4118 - nll: -1.3831 - total_loss: -1.3665 - val_direction: 0.0024 - val_kl:
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0.4119 - val_loss: -1.1995 - val_nll: -1.2171
Epoch 1592/2000
6/6             4s 653ms/step - kl:
0.4118 - nll: -1.3833 - total_loss: -1.3667 - val_direction: 0.0029 - val_kl:
0.4123 - val_loss: -1.1649 - val_nll: -1.1829
Epoch 1593/2000
6/6             4s 685ms/step - kl:
0.4118 - nll: -1.3780 - total_loss: -1.3613 - val_direction: 0.0031 - val_kl:
0.4120 - val_loss: -1.1598 - val_nll: -1.1778
Epoch 1594/2000
6/6             4s 636ms/step - kl:
0.4117 - nll: -1.3801 - total_loss: -1.3634 - val_direction: 0.0024 - val_kl:
0.4123 - val_loss: -1.1964 - val_nll: -1.2141
Epoch 1595/2000
6/6             4s 693ms/step - kl:
0.4120 - nll: -1.3838 - total_loss: -1.3671 - val_direction: 0.0023 - val_kl:
0.4126 - val_loss: -1.2012 - val_nll: -1.2188
Epoch 1596/2000
6/6             4s 730ms/step - kl:
0.4124 - nll: -1.3845 - total_loss: -1.3678 - val_direction: 0.0029 - val_kl:
0.4132 - val_loss: -1.1683 - val_nll: -1.1863
Epoch 1597/2000
6/6             4s 715ms/step - kl:
0.4126 - nll: -1.3782 - total_loss: -1.3614 - val_direction: 0.0030 - val_kl:
0.4120 - val_loss: -1.1627 - val_nll: -1.1807
Epoch 1598/2000
6/6             4s 716ms/step - kl:
0.4108 - nll: -1.3834 - total_loss: -1.3669 - val_direction: 0.0023 - val_kl:
0.4098 - val_loss: -1.2045 - val_nll: -1.2221
Epoch 1599/2000
6/6             4s 671ms/step - kl:
0.4094 - nll: -1.3841 - total_loss: -1.3675 - val_direction: 0.0026 - val_kl:
0.4107 - val_loss: -1.1835 - val_nll: -1.2012
Epoch 1600/2000
6/6             4s 643ms/step - kl:
0.4104 - nll: -1.3805 - total_loss: -1.3639 - val_direction: 0.0029 - val_kl:
0.4111 - val_loss: -1.1686 - val_nll: -1.1865
Epoch 1601/2000
6/6             4s 634ms/step - kl:
0.4106 - nll: -1.3817 - total_loss: -1.3651 - val_direction: 0.0028 - val_kl:
0.4113 - val_loss: -1.1730 - val_nll: -1.1908
Epoch 1602/2000
6/6             4s 633ms/step - kl:
0.4106 - nll: -1.3811 - total_loss: -1.3645 - val_direction: 0.0030 - val_kl:
0.4098 - val_loss: -1.1628 - val_nll: -1.1807
Epoch 1603/2000
6/6             4s 635ms/step - kl:
0.4086 - nll: -1.3792 - total_loss: -1.3627 - val_direction: 0.0030 - val_kl:
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0.4073 - val_loss: -1.1666 - val_nll: -1.1844
Epoch 1604/2000
6/6            4s 630ms/step - kl:
0.4064 - nll: -1.3828 - total_loss: -1.3664 - val_direction: 0.0024 - val_kl:
0.4071 - val_loss: -1.1974 - val_nll: -1.2149
Epoch 1605/2000
6/6            5s 816ms/step - kl:
0.4071 - nll: -1.3838 - total_loss: -1.3673 - val_direction: 0.0025 - val_kl:
0.4091 - val_loss: -1.1903 - val_nll: -1.2079
Epoch 1606/2000
6/6            4s 748ms/step - kl:
0.4102 - nll: -1.3804 - total_loss: -1.3637 - val_direction: 0.0032 - val_kl:
0.4124 - val_loss: -1.1500 - val_nll: -1.1681
Epoch 1607/2000
6/6            4s 732ms/step - kl:
0.4122 - nll: -1.3789 - total_loss: -1.3622 - val_direction: 0.0025 - val_kl:
0.4119 - val_loss: -1.1940 - val_nll: -1.2118
Epoch 1608/2000
6/6            4s 640ms/step - kl:
0.4112 - nll: -1.3841 - total_loss: -1.3675 - val_direction: 0.0025 - val_kl:
0.4111 - val_loss: -1.1890 - val_nll: -1.2067
Epoch 1609/2000
6/6            4s 639ms/step - kl:
0.4106 - nll: -1.3828 - total_loss: -1.3662 - val_direction: 0.0028 - val_kl:
0.4111 - val_loss: -1.1763 - val_nll: -1.1941
Epoch 1610/2000
6/6            4s 640ms/step - kl:
0.4097 - nll: -1.3818 - total_loss: -1.3652 - val_direction: 0.0028 - val_kl:
0.4092 - val_loss: -1.1715 - val_nll: -1.1893
Epoch 1611/2000
6/6            4s 631ms/step - kl:
0.4088 - nll: -1.3821 - total_loss: -1.3655 - val_direction: 0.0026 - val_kl:
0.4091 - val_loss: -1.1848 - val_nll: -1.2025
Epoch 1612/2000
6/6            4s 631ms/step - kl:
0.4087 - nll: -1.3816 - total_loss: -1.3651 - val_direction: 0.0030 - val_kl:
0.4102 - val_loss: -1.1645 - val_nll: -1.1824
Epoch 1613/2000
6/6            4s 634ms/step - kl:
0.4106 - nll: -1.3790 - total_loss: -1.3623 - val_direction: 0.0029 - val_kl:
0.4114 - val_loss: -1.1696 - val_nll: -1.1875
Epoch 1614/2000
6/6            5s 850ms/step - kl:
0.4100 - nll: -1.3814 - total_loss: -1.3649 - val_direction: 0.0025 - val_kl:
0.4083 - val_loss: -1.1931 - val_nll: -1.2107
Epoch 1615/2000
6/6            5s 749ms/step - kl:
0.4069 - nll: -1.3843 - total_loss: -1.3679 - val_direction: 0.0026 - val_kl:
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0.4066 - val_loss: -1.1888 - val_nll: -1.2063
Epoch 1616/2000
6/6            4s 712ms/step - kl:
0.4065 - nll: -1.3795 - total_loss: -1.3630 - val_direction: 0.0031 - val_kl:
0.4072 - val_loss: -1.1586 - val_nll: -1.1764
Epoch 1617/2000
6/6            4s 640ms/step - kl:
0.4070 - nll: -1.3813 - total_loss: -1.3648 - val_direction: 0.0027 - val_kl:
0.4077 - val_loss: -1.1818 - val_nll: -1.1994
Epoch 1618/2000
6/6            4s 639ms/step - kl:
0.4079 - nll: -1.3812 - total_loss: -1.3647 - val_direction: 0.0027 - val_kl:
0.4092 - val_loss: -1.1807 - val_nll: -1.1984
Epoch 1619/2000
6/6            4s 638ms/step - kl:
0.4095 - nll: -1.3787 - total_loss: -1.3620 - val_direction: 0.0030 - val_kl:
0.4113 - val_loss: -1.1603 - val_nll: -1.1782
Epoch 1620/2000
6/6            4s 628ms/step - kl:
0.4111 - nll: -1.3798 - total_loss: -1.3631 - val_direction: 0.0028 - val_kl:
0.4115 - val_loss: -1.1748 - val_nll: -1.1926
Epoch 1621/2000
6/6            4s 643ms/step - kl:
0.4103 - nll: -1.3803 - total_loss: -1.3637 - val_direction: 0.0027 - val_kl:
0.4100 - val_loss: -1.1801 - val_nll: -1.1979
Epoch 1622/2000
6/6            4s 652ms/step - kl:
0.4102 - nll: -1.3839 - total_loss: -1.3673 - val_direction: 0.0024 - val_kl:
0.4122 - val_loss: -1.2001 - val_nll: -1.2177
Epoch 1623/2000
6/6            5s 808ms/step - kl:
0.4131 - nll: -1.3828 - total_loss: -1.3661 - val_direction: 0.0030 - val_kl:
0.4140 - val_loss: -1.1600 - val_nll: -1.1780
Epoch 1624/2000
6/6            4s 745ms/step - kl:
0.4125 - nll: -1.3771 - total_loss: -1.3604 - val_direction: 0.0030 - val_kl:
0.4103 - val_loss: -1.1639 - val_nll: -1.1818
Epoch 1625/2000
6/6            4s 723ms/step - kl:
0.4081 - nll: -1.3833 - total_loss: -1.3668 - val_direction: 0.0018 - val_kl:
0.4067 - val_loss: -1.2343 - val_nll: -1.2515
Epoch 1626/2000
6/6            4s 647ms/step - kl:
0.4071 - nll: -1.3848 - total_loss: -1.3683 - val_direction: 0.0029 - val_kl:
0.4096 - val_loss: -1.1676 - val_nll: -1.1854
Epoch 1627/2000
6/6            4s 640ms/step - kl:
0.4103 - nll: -1.3790 - total_loss: -1.3623 - val_direction: 0.0031 - val_kl:
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0.4118 - val_loss: -1.1574 - val_nll: -1.1754
Epoch 1628/2000
6/6            4s 644ms/step - kl:
0.4107 - nll: -1.3824 - total_loss: -1.3659 - val_direction: 0.0024 - val_kl:
0.4096 - val_loss: -1.1960 - val_nll: -1.2136
Epoch 1629/2000
6/6            4s 657ms/step - kl:
0.4082 - nll: -1.3834 - total_loss: -1.3670 - val_direction: 0.0026 - val_kl:
0.4073 - val_loss: -1.1865 - val_nll: -1.2040
Epoch 1630/2000
6/6            4s 634ms/step - kl:
0.4065 - nll: -1.3838 - total_loss: -1.3674 - val_direction: 0.0028 - val_kl:
0.4078 - val_loss: -1.1722 - val_nll: -1.1899
Epoch 1631/2000
6/6            4s 638ms/step - kl:
0.4078 - nll: -1.3802 - total_loss: -1.3636 - val_direction: 0.0030 - val_kl:
0.4088 - val_loss: -1.1619 - val_nll: -1.1798
Epoch 1632/2000
6/6            4s 635ms/step - kl:
0.4084 - nll: -1.3814 - total_loss: -1.3648 - val_direction: 0.0025 - val_kl:
0.4084 - val_loss: -1.1923 - val_nll: -1.2099
Epoch 1633/2000
6/6            4s 735ms/step - kl:
0.4072 - nll: -1.3839 - total_loss: -1.3675 - val_direction: 0.0025 - val_kl:
0.4066 - val_loss: -1.1895 - val_nll: -1.2070
Epoch 1634/2000
6/6            4s 696ms/step - kl:
0.4066 - nll: -1.3819 - total_loss: -1.3654 - val_direction: 0.0030 - val_kl:
0.4076 - val_loss: -1.1641 - val_nll: -1.1819
Epoch 1635/2000
6/6            4s 749ms/step - kl:
0.4071 - nll: -1.3803 - total_loss: -1.3639 - val_direction: 0.0028 - val_kl:
0.4068 - val_loss: -1.1787 - val_nll: -1.1963
Epoch 1636/2000
6/6            4s 657ms/step - kl:
0.4062 - nll: -1.3801 - total_loss: -1.3637 - val_direction: 0.0029 - val_kl:
0.4067 - val_loss: -1.1650 - val_nll: -1.1827
Epoch 1637/2000
6/6            4s 659ms/step - kl:
0.4062 - nll: -1.3815 - total_loss: -1.3651 - val_direction: 0.0025 - val_kl:
0.4067 - val_loss: -1.1897 - val_nll: -1.2072
Epoch 1638/2000
6/6            4s 640ms/step - kl:
0.4069 - nll: -1.3824 - total_loss: -1.3659 - val_direction: 0.0028 - val_kl:
0.4086 - val_loss: -1.1729 - val_nll: -1.1907
Epoch 1639/2000
6/6            4s 631ms/step - kl:
0.4092 - nll: -1.3801 - total_loss: -1.3635 - val_direction: 0.0030 - val_kl:
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0.4104 - val_loss: -1.1612 - val_nll: -1.1791
Epoch 1640/2000
6/6            4s 703ms/step - kl:
0.4099 - nll: -1.3779 - total_loss: -1.3613 - val_direction: 0.0028 - val_kl:
0.4096 - val_loss: -1.1722 - val_nll: -1.1900
Epoch 1641/2000
6/6            4s 634ms/step - kl:
0.4085 - nll: -1.3813 - total_loss: -1.3648 - val_direction: 0.0027 - val_kl:
0.4081 - val_loss: -1.1808 - val_nll: -1.1985
Epoch 1642/2000
6/6            5s 800ms/step - kl:
0.4069 - nll: -1.3832 - total_loss: -1.3668 - val_direction: 0.0023 - val_kl:
0.4074 - val_loss: -1.2040 - val_nll: -1.2214
Epoch 1643/2000
6/6            4s 726ms/step - kl:
0.4084 - nll: -1.3836 - total_loss: -1.3671 - val_direction: 0.0028 - val_kl:
0.4102 - val_loss: -1.1752 - val_nll: -1.1930
Epoch 1644/2000
6/6            4s 744ms/step - kl:
0.4093 - nll: -1.3812 - total_loss: -1.3647 - val_direction: 0.0028 - val_kl:
0.4079 - val_loss: -1.1733 - val_nll: -1.1910
Epoch 1645/2000
6/6            4s 644ms/step - kl:
0.4054 - nll: -1.3817 - total_loss: -1.3654 - val_direction: 0.0025 - val_kl:
0.4031 - val_loss: -1.1903 - val_nll: -1.2077
Epoch 1646/2000
6/6            4s 647ms/step - kl:
0.4031 - nll: -1.3805 - total_loss: -1.3641 - val_direction: 0.0025 - val_kl:
0.4044 - val_loss: -1.1898 - val_nll: -1.2072
Epoch 1647/2000
6/6            4s 639ms/step - kl:
0.4052 - nll: -1.3838 - total_loss: -1.3673 - val_direction: 0.0025 - val_kl:
0.4084 - val_loss: -1.1901 - val_nll: -1.2077
Epoch 1648/2000
6/6            4s 632ms/step - kl:
0.4096 - nll: -1.3811 - total_loss: -1.3645 - val_direction: 0.0031 - val_kl:
0.4115 - val_loss: -1.1575 - val_nll: -1.1755
Epoch 1649/2000
6/6            4s 634ms/step - kl:
0.4102 - nll: -1.3789 - total_loss: -1.3623 - val_direction: 0.0026 - val_kl:
0.4075 - val_loss: -1.1884 - val_nll: -1.2060
Epoch 1650/2000
6/6            4s 638ms/step - kl:
0.4045 - nll: -1.3829 - total_loss: -1.3666 - val_direction: 0.0022 - val_kl:
0.4018 - val_loss: -1.2089 - val_nll: -1.2261
Epoch 1651/2000
6/6            4s 769ms/step - kl:
0.4014 - nll: -1.3831 - total_loss: -1.3668 - val_direction: 0.0027 - val_kl:
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0.4028 - val_loss: -1.1790 - val_nll: -1.1965
Epoch 1652/2000
6/6            5s 756ms/step - kl:
0.4038 - nll: -1.3806 - total_loss: -1.3641 - val_direction: 0.0031 - val_kl:
0.4067 - val_loss: -1.1587 - val_nll: -1.1765
Epoch 1653/2000
6/6            4s 696ms/step - kl:
0.4077 - nll: -1.3795 - total_loss: -1.3629 - val_direction: 0.0029 - val_kl:
0.4089 - val_loss: -1.1671 - val_nll: -1.1849
Epoch 1654/2000
6/6            4s 642ms/step - kl:
0.4082 - nll: -1.3800 - total_loss: -1.3635 - val_direction: 0.0028 - val_kl:
0.4073 - val_loss: -1.1746 - val_nll: -1.1923
Epoch 1655/2000
6/6            4s 650ms/step - kl:
0.4061 - nll: -1.3821 - total_loss: -1.3657 - val_direction: 0.0023 - val_kl:
0.4057 - val_loss: -1.2023 - val_nll: -1.2197
Epoch 1656/2000
6/6            4s 645ms/step - kl:
0.4051 - nll: -1.3835 - total_loss: -1.3671 - val_direction: 0.0025 - val_kl:
0.4048 - val_loss: -1.1910 - val_nll: -1.2084
Epoch 1657/2000
6/6            4s 631ms/step - kl:
0.4046 - nll: -1.3825 - total_loss: -1.3661 - val_direction: 0.0030 - val_kl:
0.4058 - val_loss: -1.1595 - val_nll: -1.1772
Epoch 1658/2000
6/6            4s 635ms/step - kl:
0.4053 - nll: -1.3802 - total_loss: -1.3637 - val_direction: 0.0029 - val_kl:
0.4049 - val_loss: -1.1697 - val_nll: -1.1874
Epoch 1659/2000
6/6            4s 657ms/step - kl:
0.4043 - nll: -1.3814 - total_loss: -1.3651 - val_direction: 0.0026 - val_kl:
0.4040 - val_loss: -1.1838 - val_nll: -1.2013
Epoch 1660/2000
6/6            4s 636ms/step - kl:
0.4023 - nll: -1.3839 - total_loss: -1.3677 - val_direction: 0.0022 - val_kl:
0.4010 - val_loss: -1.2090 - val_nll: -1.2262
Epoch 1661/2000
6/6            4s 765ms/step - kl:
0.4012 - nll: -1.3834 - total_loss: -1.3671 - val_direction: 0.0030 - val_kl:
0.4032 - val_loss: -1.1589 - val_nll: -1.1765
Epoch 1662/2000
6/6            4s 739ms/step - kl:
0.4036 - nll: -1.3781 - total_loss: -1.3617 - val_direction: 0.0029 - val_kl:
0.4048 - val_loss: -1.1722 - val_nll: -1.1899
Epoch 1663/2000
6/6            4s 722ms/step - kl:
0.4042 - nll: -1.3832 - total_loss: -1.3669 - val_direction: 0.0023 - val_kl:
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0.4045 - val_loss: -1.1995 - val_nll: -1.2168
Epoch 1664/2000
6/6             4s 641ms/step - kl:
0.4050 - nll: -1.3818 - total_loss: -1.3653 - val_direction: 0.0031 - val_kl:
0.4074 - val_loss: -1.1547 - val_nll: -1.1725
Epoch 1665/2000
6/6             4s 644ms/step - kl:
0.4083 - nll: -1.3781 - total_loss: -1.3614 - val_direction: 0.0028 - val_kl:
0.4091 - val_loss: -1.1762 - val_nll: -1.1940
Epoch 1666/2000
6/6             4s 653ms/step - kl:
0.4071 - nll: -1.3810 - total_loss: -1.3646 - val_direction: 0.0023 - val_kl:
0.4051 - val_loss: -1.2032 - val_nll: -1.2206
Epoch 1667/2000
6/6             4s 654ms/step - kl:
0.4045 - nll: -1.3824 - total_loss: -1.3660 - val_direction: 0.0026 - val_kl:
0.4055 - val_loss: -1.1822 - val_nll: -1.1998
Epoch 1668/2000
6/6             4s 630ms/step - kl:
0.4056 - nll: -1.3831 - total_loss: -1.3667 - val_direction: 0.0027 - val_kl:
0.4056 - val_loss: -1.1809 - val_nll: -1.1985
Epoch 1669/2000
6/6             4s 632ms/step - kl:
0.4048 - nll: -1.3786 - total_loss: -1.3622 - val_direction: 0.0031 - val_kl:
0.4048 - val_loss: -1.1538 - val_nll: -1.1716
Epoch 1670/2000
6/6             4s 680ms/step - kl:
0.4041 - nll: -1.3808 - total_loss: -1.3645 - val_direction: 0.0026 - val_kl:
0.4033 - val_loss: -1.1889 - val_nll: -1.2063
Epoch 1671/2000
6/6             5s 750ms/step - kl:
0.4023 - nll: -1.3818 - total_loss: -1.3656 - val_direction: 0.0026 - val_kl:
0.4020 - val_loss: -1.1799 - val_nll: -1.1973
Epoch 1672/2000
6/6             4s 658ms/step - kl:
0.4021 - nll: -1.3827 - total_loss: -1.3664 - val_direction: 0.0026 - val_kl:
0.4038 - val_loss: -1.1841 - val_nll: -1.2015
Epoch 1673/2000
6/6             4s 704ms/step - kl:
0.4047 - nll: -1.3824 - total_loss: -1.3660 - val_direction: 0.0027 - val_kl:
0.4065 - val_loss: -1.1766 - val_nll: -1.1942
Epoch 1674/2000
6/6             4s 667ms/step - kl:
0.4058 - nll: -1.3806 - total_loss: -1.3642 - val_direction: 0.0029 - val_kl:
0.4054 - val_loss: -1.1640 - val_nll: -1.1816
Epoch 1675/2000
6/6             4s 644ms/step - kl:
0.4041 - nll: -1.3806 - total_loss: -1.3642 - val_direction: 0.0028 - val_kl:
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0.4030 - val_loss: -1.1742 - val_nll: -1.1917
Epoch 1676/2000
6/6            4s 631ms/step - kl:
0.4021 - nll: -1.3814 - total_loss: -1.3651 - val_direction: 0.0028 - val_kl:
0.4025 - val_loss: -1.1756 - val_nll: -1.1931
Epoch 1677/2000
6/6            4s 633ms/step - kl:
0.4034 - nll: -1.3804 - total_loss: -1.3640 - val_direction: 0.0027 - val_kl:
0.4056 - val_loss: -1.1799 - val_nll: -1.1975
Epoch 1678/2000
6/6            4s 635ms/step - kl:
0.4057 - nll: -1.3821 - total_loss: -1.3657 - val_direction: 0.0027 - val_kl:
0.4063 - val_loss: -1.1768 - val_nll: -1.1944
Epoch 1679/2000
6/6            4s 631ms/step - kl:
0.4058 - nll: -1.3829 - total_loss: -1.3665 - val_direction: 0.0025 - val_kl:
0.4052 - val_loss: -1.1908 - val_nll: -1.2083
Epoch 1680/2000
6/6            4s 741ms/step - kl:
0.4033 - nll: -1.3824 - total_loss: -1.3661 - val_direction: 0.0028 - val_kl:
0.4018 - val_loss: -1.1742 - val_nll: -1.1916
Epoch 1681/2000
6/6            4s 722ms/step - kl:
0.4010 - nll: -1.3792 - total_loss: -1.3630 - val_direction: 0.0025 - val_kl:
0.4010 - val_loss: -1.1927 - val_nll: -1.2100
Epoch 1682/2000
6/6            4s 758ms/step - kl:
0.4011 - nll: -1.3835 - total_loss: -1.3673 - val_direction: 0.0026 - val_kl:
0.4029 - val_loss: -1.1850 - val_nll: -1.2025
Epoch 1683/2000
6/6            4s 650ms/step - kl:
0.4031 - nll: -1.3833 - total_loss: -1.3670 - val_direction: 0.0027 - val_kl:
0.4040 - val_loss: -1.1765 - val_nll: -1.1940
Epoch 1684/2000
6/6            4s 646ms/step - kl:
0.4027 - nll: -1.3800 - total_loss: -1.3638 - val_direction: 0.0031 - val_kl:
0.4013 - val_loss: -1.1556 - val_nll: -1.1732
Epoch 1685/2000
6/6            4s 639ms/step - kl:
0.4000 - nll: -1.3785 - total_loss: -1.3623 - val_direction: 0.0028 - val_kl:
0.3997 - val_loss: -1.1791 - val_nll: -1.1965
Epoch 1686/2000
6/6            4s 640ms/step - kl:
0.3993 - nll: -1.3835 - total_loss: -1.3673 - val_direction: 0.0022 - val_kl:
0.4000 - val_loss: -1.2090 - val_nll: -1.2260
Epoch 1687/2000
6/6            4s 637ms/step - kl:
0.4005 - nll: -1.3846 - total_loss: -1.3684 - val_direction: 0.0029 - val_kl:
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0.4028 - val_loss: -1.1673 - val_nll: -1.1849
Epoch 1688/2000
6/6            4s 634ms/step - kl:
0.4030 - nll: -1.3801 - total_loss: -1.3638 - val_direction: 0.0030 - val_kl:
0.4035 - val_loss: -1.1611 - val_nll: -1.1787
Epoch 1689/2000
6/6            5s 822ms/step - kl:
0.4020 - nll: -1.3815 - total_loss: -1.3653 - val_direction: 0.0022 - val_kl:
0.4009 - val_loss: -1.2073 - val_nll: -1.2244
Epoch 1690/2000
6/6            5s 757ms/step - kl:
0.3998 - nll: -1.3843 - total_loss: -1.3681 - val_direction: 0.0026 - val_kl:
0.4001 - val_loss: -1.1884 - val_nll: -1.2057
Epoch 1691/2000
6/6            4s 732ms/step - kl:
0.4002 - nll: -1.3826 - total_loss: -1.3664 - val_direction: 0.0030 - val_kl:
0.4016 - val_loss: -1.1630 - val_nll: -1.1806
Epoch 1692/2000
6/6            4s 641ms/step - kl:
0.4008 - nll: -1.3784 - total_loss: -1.3621 - val_direction: 0.0028 - val_kl:
0.3996 - val_loss: -1.1762 - val_nll: -1.1936
Epoch 1693/2000
6/6            4s 643ms/step - kl:
0.3983 - nll: -1.3841 - total_loss: -1.3680 - val_direction: 0.0023 - val_kl:
0.3982 - val_loss: -1.2060 - val_nll: -1.2231
Epoch 1694/2000
6/6            4s 636ms/step - kl:
0.3980 - nll: -1.3831 - total_loss: -1.3669 - val_direction: 0.0028 - val_kl:
0.3996 - val_loss: -1.1747 - val_nll: -1.1920
Epoch 1695/2000
6/6            4s 633ms/step - kl:
0.4003 - nll: -1.3799 - total_loss: -1.3636 - val_direction: 0.0028 - val_kl:
0.4014 - val_loss: -1.1753 - val_nll: -1.1927
Epoch 1696/2000
6/6            4s 639ms/step - kl:
0.4014 - nll: -1.3782 - total_loss: -1.3619 - val_direction: 0.0027 - val_kl:
0.4027 - val_loss: -1.1784 - val_nll: -1.1959
Epoch 1697/2000
6/6            4s 649ms/step - kl:
0.4027 - nll: -1.3820 - total_loss: -1.3657 - val_direction: 0.0026 - val_kl:
0.4036 - val_loss: -1.1876 - val_nll: -1.2050
Epoch 1698/2000
6/6            5s 802ms/step - kl:
0.4029 - nll: -1.3801 - total_loss: -1.3638 - val_direction: 0.0032 - val_kl:
0.4032 - val_loss: -1.1528 - val_nll: -1.1705
Epoch 1699/2000
6/6            4s 726ms/step - kl:
0.4028 - nll: -1.3804 - total_loss: -1.3641 - val_direction: 0.0026 - val_kl:
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0.4025 - val_loss: -1.1874 - val_nll: -1.2048
Epoch 1700/2000
6/6             4s 725ms/step - kl:
0.4013 - nll: -1.3827 - total_loss: -1.3666 - val_direction: 0.0026 - val_kl:
0.4007 - val_loss: -1.1845 - val_nll: -1.2019
Epoch 1701/2000
6/6             4s 642ms/step - kl:
0.4007 - nll: -1.3819 - total_loss: -1.3656 - val_direction: 0.0029 - val_kl:
0.4019 - val_loss: -1.1709 - val_nll: -1.1884
Epoch 1702/2000
6/6             4s 641ms/step - kl:
0.4013 - nll: -1.3791 - total_loss: -1.3629 - val_direction: 0.0028 - val_kl:
0.4006 - val_loss: -1.1703 - val_nll: -1.1877
Epoch 1703/2000
6/6             4s 646ms/step - kl:
0.3995 - nll: -1.3813 - total_loss: -1.3652 - val_direction: 0.0027 - val_kl:
0.4000 - val_loss: -1.1806 - val_nll: -1.1980
Epoch 1704/2000
6/6             4s 661ms/step - kl:
0.4004 - nll: -1.3821 - total_loss: -1.3658 - val_direction: 0.0027 - val_kl:
0.4027 - val_loss: -1.1787 - val_nll: -1.1962
Epoch 1705/2000
6/6             4s 637ms/step - kl:
0.4033 - nll: -1.3822 - total_loss: -1.3659 - val_direction: 0.0026 - val_kl:
0.4047 - val_loss: -1.1843 - val_nll: -1.2018
Epoch 1706/2000
6/6             4s 641ms/step - kl:
0.4045 - nll: -1.3801 - total_loss: -1.3638 - val_direction: 0.0029 - val_kl:
0.4045 - val_loss: -1.1713 - val_nll: -1.1889
Epoch 1707/2000
6/6             5s 826ms/step - kl:
0.4030 - nll: -1.3791 - total_loss: -1.3628 - val_direction: 0.0026 - val_kl:
0.4021 - val_loss: -1.1869 - val_nll: -1.2043
Epoch 1708/2000
6/6             4s 729ms/step - kl:
0.4012 - nll: -1.3828 - total_loss: -1.3665 - val_direction: 0.0027 - val_kl:
0.4016 - val_loss: -1.1783 - val_nll: -1.1958
Epoch 1709/2000
6/6             4s 721ms/step - kl:
0.4017 - nll: -1.3809 - total_loss: -1.3647 - val_direction: 0.0027 - val_kl:
0.4018 - val_loss: -1.1771 - val_nll: -1.1946
Epoch 1710/2000
6/6             4s 649ms/step - kl:
0.4012 - nll: -1.3815 - total_loss: -1.3652 - val_direction: 0.0030 - val_kl:
0.4019 - val_loss: -1.1661 - val_nll: -1.1837
Epoch 1711/2000
6/6             4s 657ms/step - kl:
0.4022 - nll: -1.3819 - total_loss: -1.3656 - val_direction: 0.0026 - val_kl:
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0.4025 - val_loss: -1.1865 - val_nll: -1.2039
Epoch 1712/2000
6/6            4s 663ms/step - kl:
0.4012 - nll: -1.3832 - total_loss: -1.3670 - val_direction: 0.0024 - val_kl:
0.3995 - val_loss: -1.1972 - val_nll: -1.2143
Epoch 1713/2000
6/6            4s 631ms/step - kl:
0.3986 - nll: -1.3834 - total_loss: -1.3673 - val_direction: 0.0031 - val_kl:
0.3989 - val_loss: -1.1579 - val_nll: -1.1754
Epoch 1714/2000
6/6            4s 710ms/step - kl:
0.3980 - nll: -1.3801 - total_loss: -1.3639 - val_direction: 0.0027 - val_kl:
0.3974 - val_loss: -1.1801 - val_nll: -1.1973
Epoch 1715/2000
6/6            4s 641ms/step - kl:
0.3967 - nll: -1.3821 - total_loss: -1.3661 - val_direction: 0.0027 - val_kl:
0.3971 - val_loss: -1.1804 - val_nll: -1.1976
Epoch 1716/2000
6/6            5s 790ms/step - kl:
0.3972 - nll: -1.3826 - total_loss: -1.3665 - val_direction: 0.0027 - val_kl:
0.3986 - val_loss: -1.1813 - val_nll: -1.1986
Epoch 1717/2000
6/6            4s 744ms/step - kl:
0.3982 - nll: -1.3804 - total_loss: -1.3643 - val_direction: 0.0029 - val_kl:
0.3987 - val_loss: -1.1685 - val_nll: -1.1859
Epoch 1718/2000
6/6            4s 731ms/step - kl:
0.3982 - nll: -1.3793 - total_loss: -1.3632 - val_direction: 0.0029 - val_kl:
0.3982 - val_loss: -1.1708 - val_nll: -1.1882
Epoch 1719/2000
6/6            4s 668ms/step - kl:
0.3989 - nll: -1.3824 - total_loss: -1.3662 - val_direction: 0.0026 - val_kl:
0.4010 - val_loss: -1.1847 - val_nll: -1.2021
Epoch 1720/2000
6/6            4s 643ms/step - kl:
0.4011 - nll: -1.3827 - total_loss: -1.3665 - val_direction: 0.0028 - val_kl:
0.4010 - val_loss: -1.1722 - val_nll: -1.1897
Epoch 1721/2000
6/6            4s 642ms/step - kl:
0.3995 - nll: -1.3830 - total_loss: -1.3669 - val_direction: 0.0025 - val_kl:
0.3986 - val_loss: -1.1912 - val_nll: -1.2084
Epoch 1722/2000
6/6            4s 630ms/step - kl:
0.3981 - nll: -1.3817 - total_loss: -1.3656 - val_direction: 0.0028 - val_kl:
0.3980 - val_loss: -1.1729 - val_nll: -1.1902
Epoch 1723/2000
6/6            4s 629ms/step - kl:
0.3980 - nll: -1.3794 - total_loss: -1.3632 - val_direction: 0.0029 - val_kl:
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0.3984 - val_loss: -1.1698 - val_nll: -1.1872
Epoch 1724/2000
6/6             4s 636ms/step - kl:
0.3975 - nll: -1.3817 - total_loss: -1.3656 - val_direction: 0.0024 - val_kl:
0.3980 - val_loss: -1.2019 - val_nll: -1.2190
Epoch 1725/2000
6/6             4s 639ms/step - kl:
0.3985 - nll: -1.3840 - total_loss: -1.3678 - val_direction: 0.0025 - val_kl:
0.4007 - val_loss: -1.1867 - val_nll: -1.2040
Epoch 1726/2000
6/6             5s 774ms/step - kl:
0.4006 - nll: -1.3825 - total_loss: -1.3663 - val_direction: 0.0030 - val_kl:
0.4010 - val_loss: -1.1614 - val_nll: -1.1790
Epoch 1727/2000
6/6             4s 714ms/step - kl:
0.3992 - nll: -1.3792 - total_loss: -1.3630 - val_direction: 0.0029 - val_kl:
0.3973 - val_loss: -1.1658 - val_nll: -1.1832
Epoch 1728/2000
6/6             4s 729ms/step - kl:
0.3958 - nll: -1.3812 - total_loss: -1.3652 - val_direction: 0.0026 - val_kl:
0.3955 - val_loss: -1.1861 - val_nll: -1.2032
Epoch 1729/2000
6/6             4s 640ms/step - kl:
0.3959 - nll: -1.3841 - total_loss: -1.3680 - val_direction: 0.0026 - val_kl:
0.3974 - val_loss: -1.1829 - val_nll: -1.2001
Epoch 1730/2000
6/6             4s 646ms/step - kl:
0.3974 - nll: -1.3807 - total_loss: -1.3646 - val_direction: 0.0030 - val_kl:
0.3985 - val_loss: -1.1618 - val_nll: -1.1792
Epoch 1731/2000
6/6             4s 636ms/step - kl:
0.3986 - nll: -1.3810 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.4002 - val_loss: -1.1848 - val_nll: -1.2021
Epoch 1732/2000
6/6             4s 633ms/step - kl:
0.3999 - nll: -1.3826 - total_loss: -1.3664 - val_direction: 0.0026 - val_kl:
0.4004 - val_loss: -1.1887 - val_nll: -1.2060
Epoch 1733/2000
6/6             4s 635ms/step - kl:
0.4001 - nll: -1.3816 - total_loss: -1.3653 - val_direction: 0.0031 - val_kl:
0.4009 - val_loss: -1.1564 - val_nll: -1.1740
Epoch 1734/2000
6/6             4s 661ms/step - kl:
0.4005 - nll: -1.3775 - total_loss: -1.3613 - val_direction: 0.0028 - val_kl:
0.3999 - val_loss: -1.1740 - val_nll: -1.1914
Epoch 1735/2000
6/6             5s 790ms/step - kl:
0.3988 - nll: -1.3820 - total_loss: -1.3659 - val_direction: 0.0024 - val_kl:
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0.3988 - val_loss: -1.1952 - val_nll: -1.2124
Epoch 1736/2000
6/6             4s 747ms/step - kl:
0.3986 - nll: -1.3825 - total_loss: -1.3664 - val_direction: 0.0028 - val_kl:
0.3990 - val_loss: -1.1710 - val_nll: -1.1884
Epoch 1737/2000
6/6             4s 704ms/step - kl:
0.3975 - nll: -1.3819 - total_loss: -1.3658 - val_direction: 0.0027 - val_kl:
0.3963 - val_loss: -1.1804 - val_nll: -1.1976
Epoch 1738/2000
6/6             4s 641ms/step - kl:
0.3953 - nll: -1.3821 - total_loss: -1.3661 - val_direction: 0.0023 - val_kl:
0.3953 - val_loss: -1.2046 - val_nll: -1.2216
Epoch 1739/2000
6/6             4s 640ms/step - kl:
0.3960 - nll: -1.3820 - total_loss: -1.3660 - val_direction: 0.0029 - val_kl:
0.3987 - val_loss: -1.1697 - val_nll: -1.1871
Epoch 1740/2000
6/6             4s 646ms/step - kl:
0.3994 - nll: -1.3796 - total_loss: -1.3633 - val_direction: 0.0029 - val_kl:
0.4015 - val_loss: -1.1713 - val_nll: -1.1888
Epoch 1741/2000
6/6             4s 648ms/step - kl:
0.4006 - nll: -1.3808 - total_loss: -1.3646 - val_direction: 0.0024 - val_kl:
0.3993 - val_loss: -1.2008 - val_nll: -1.2180
Epoch 1742/2000
6/6             4s 647ms/step - kl:
0.3968 - nll: -1.3821 - total_loss: -1.3661 - val_direction: 0.0028 - val_kl:
0.3949 - val_loss: -1.1754 - val_nll: -1.1926
Epoch 1743/2000
6/6             4s 632ms/step - kl:
0.3950 - nll: -1.3809 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.3962 - val_loss: -1.1892 - val_nll: -1.2064
Epoch 1744/2000
6/6             4s 658ms/step - kl:
0.3956 - nll: -1.3828 - total_loss: -1.3668 - val_direction: 0.0021 - val_kl:
0.3957 - val_loss: -1.2130 - val_nll: -1.2299
Epoch 1745/2000
6/6             5s 784ms/step - kl:
0.3963 - nll: -1.3841 - total_loss: -1.3680 - val_direction: 0.0029 - val_kl:
0.3989 - val_loss: -1.1687 - val_nll: -1.1861
Epoch 1746/2000
6/6             4s 672ms/step - kl:
0.3992 - nll: -1.3800 - total_loss: -1.3638 - val_direction: 0.0033 - val_kl:
0.3993 - val_loss: -1.1468 - val_nll: -1.1644
Epoch 1747/2000
6/6             4s 699ms/step - kl:
0.3982 - nll: -1.3793 - total_loss: -1.3631 - val_direction: 0.0025 - val_kl:
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0.3975 - val_loss: -1.1949 - val_nll: -1.2120
Epoch 1748/2000
6/6            4s 645ms/step - kl:
0.3962 - nll: -1.3848 - total_loss: -1.3688 - val_direction: 0.0023 - val_kl:
0.3954 - val_loss: -1.2038 - val_nll: -1.2208
Epoch 1749/2000
6/6            4s 666ms/step - kl:
0.3945 - nll: -1.3817 - total_loss: -1.3658 - val_direction: 0.0030 - val_kl:
0.3949 - val_loss: -1.1604 - val_nll: -1.1777
Epoch 1750/2000
6/6            4s 638ms/step - kl:
0.3944 - nll: -1.3803 - total_loss: -1.3643 - val_direction: 0.0029 - val_kl:
0.3957 - val_loss: -1.1707 - val_nll: -1.1880
Epoch 1751/2000
6/6            4s 643ms/step - kl:
0.3952 - nll: -1.3804 - total_loss: -1.3643 - val_direction: 0.0024 - val_kl:
0.3957 - val_loss: -1.1977 - val_nll: -1.2147
Epoch 1752/2000
6/6            4s 672ms/step - kl:
0.3956 - nll: -1.3836 - total_loss: -1.3676 - val_direction: 0.0026 - val_kl:
0.3966 - val_loss: -1.1872 - val_nll: -1.2043
Epoch 1753/2000
6/6            4s 632ms/step - kl:
0.3977 - nll: -1.3805 - total_loss: -1.3643 - val_direction: 0.0030 - val_kl:
0.4005 - val_loss: -1.1619 - val_nll: -1.1795
Epoch 1754/2000
6/6            5s 797ms/step - kl:
0.3998 - nll: -1.3800 - total_loss: -1.3638 - val_direction: 0.0025 - val_kl:
0.3986 - val_loss: -1.1948 - val_nll: -1.2120
Epoch 1755/2000
6/6            4s 721ms/step - kl:
0.3970 - nll: -1.3834 - total_loss: -1.3674 - val_direction: 0.0024 - val_kl:
0.3963 - val_loss: -1.1947 - val_nll: -1.2118
Epoch 1756/2000
6/6            4s 759ms/step - kl:
0.3955 - nll: -1.3820 - total_loss: -1.3660 - val_direction: 0.0029 - val_kl:
0.3953 - val_loss: -1.1720 - val_nll: -1.1892
Epoch 1757/2000
6/6            4s 645ms/step - kl:
0.3950 - nll: -1.3780 - total_loss: -1.3619 - val_direction: 0.0030 - val_kl:
0.3953 - val_loss: -1.1646 - val_nll: -1.1819
Epoch 1758/2000
6/6            4s 647ms/step - kl:
0.3940 - nll: -1.3821 - total_loss: -1.3662 - val_direction: 0.0023 - val_kl:
0.3933 - val_loss: -1.2059 - val_nll: -1.2228
Epoch 1759/2000
6/6            4s 637ms/step - kl:
0.3938 - nll: -1.3835 - total_loss: -1.3675 - val_direction: 0.0028 - val_kl:
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0.3966 - val_loss: -1.1727 - val_nll: -1.1900
Epoch 1760/2000
6/6            4s 639ms/step - kl:
0.3978 - nll: -1.3794 - total_loss: -1.3631 - val_direction: 0.0030 - val_kl:
0.4001 - val_loss: -1.1626 - val_nll: -1.1801
Epoch 1761/2000
6/6            4s 629ms/step - kl:
0.3991 - nll: -1.3812 - total_loss: -1.3651 - val_direction: 0.0025 - val_kl:
0.3981 - val_loss: -1.1931 - val_nll: -1.2103
Epoch 1762/2000
6/6            4s 633ms/step - kl:
0.3970 - nll: -1.3836 - total_loss: -1.3675 - val_direction: 0.0025 - val_kl:
0.3970 - val_loss: -1.1877 - val_nll: -1.2048
Epoch 1763/2000
6/6            4s 716ms/step - kl:
0.3965 - nll: -1.3845 - total_loss: -1.3685 - val_direction: 0.0028 - val_kl:
0.3973 - val_loss: -1.1768 - val_nll: -1.1941
Epoch 1764/2000
6/6            5s 752ms/step - kl:
0.3972 - nll: -1.3804 - total_loss: -1.3643 - val_direction: 0.0031 - val_kl:
0.3970 - val_loss: -1.1537 - val_nll: -1.1712
Epoch 1765/2000
6/6            4s 663ms/step - kl:
0.3948 - nll: -1.3794 - total_loss: -1.3634 - val_direction: 0.0027 - val_kl:
0.3926 - val_loss: -1.1829 - val_nll: -1.2000
Epoch 1766/2000
6/6            4s 691ms/step - kl:
0.3922 - nll: -1.3839 - total_loss: -1.3680 - val_direction: 0.0023 - val_kl:
0.3938 - val_loss: -1.2055 - val_nll: -1.2224
Epoch 1767/2000
6/6            4s 644ms/step - kl:
0.3947 - nll: -1.3827 - total_loss: -1.3667 - val_direction: 0.0029 - val_kl:
0.3969 - val_loss: -1.1711 - val_nll: -1.1884
Epoch 1768/2000
6/6            4s 640ms/step - kl:
0.3962 - nll: -1.3794 - total_loss: -1.3633 - val_direction: 0.0027 - val_kl:
0.3953 - val_loss: -1.1845 - val_nll: -1.2016
Epoch 1769/2000
6/6            4s 640ms/step - kl:
0.3930 - nll: -1.3831 - total_loss: -1.3673 - val_direction: 0.0024 - val_kl:
0.3911 - val_loss: -1.2009 - val_nll: -1.2177
Epoch 1770/2000
6/6            4s 712ms/step - kl:
0.3907 - nll: -1.3823 - total_loss: -1.3665 - val_direction: 0.0031 - val_kl:
0.3918 - val_loss: -1.1545 - val_nll: -1.1717
Epoch 1771/2000
6/6            4s 654ms/step - kl:
0.3917 - nll: -1.3802 - total_loss: -1.3642 - val_direction: 0.0026 - val_kl:
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0.3931 - val_loss: -1.1921 - val_nll: -1.2091
Epoch 1772/2000
6/6            4s 634ms/step - kl:
0.3938 - nll: -1.3834 - total_loss: -1.3674 - val_direction: 0.0024 - val_kl:
0.3961 - val_loss: -1.1949 - val_nll: -1.2120
Epoch 1773/2000
6/6            5s 799ms/step - kl:
0.3967 - nll: -1.3815 - total_loss: -1.3654 - val_direction: 0.0033 - val_kl:
0.3978 - val_loss: -1.1461 - val_nll: -1.1637
Epoch 1774/2000
6/6            4s 746ms/step - kl:
0.3964 - nll: -1.3775 - total_loss: -1.3614 - val_direction: 0.0026 - val_kl:
0.3936 - val_loss: -1.1868 - val_nll: -1.2038
Epoch 1775/2000
6/6            4s 731ms/step - kl:
0.3912 - nll: -1.3830 - total_loss: -1.3673 - val_direction: 0.0022 - val_kl:
0.3897 - val_loss: -1.2104 - val_nll: -1.2271
Epoch 1776/2000
6/6            4s 642ms/step - kl:
0.3898 - nll: -1.3843 - total_loss: -1.3685 - val_direction: 0.0027 - val_kl:
0.3920 - val_loss: -1.1824 - val_nll: -1.1994
Epoch 1777/2000
6/6            4s 645ms/step - kl:
0.3934 - nll: -1.3806 - total_loss: -1.3646 - val_direction: 0.0028 - val_kl:
0.3967 - val_loss: -1.1744 - val_nll: -1.1916
Epoch 1778/2000
6/6            4s 647ms/step - kl:
0.3971 - nll: -1.3799 - total_loss: -1.3637 - val_direction: 0.0029 - val_kl:
0.3980 - val_loss: -1.1676 - val_nll: -1.1850
Epoch 1779/2000
6/6            4s 653ms/step - kl:
0.3966 - nll: -1.3808 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.3952 - val_loss: -1.1847 - val_nll: -1.2018
Epoch 1780/2000
6/6            4s 636ms/step - kl:
0.3940 - nll: -1.3838 - total_loss: -1.3679 - val_direction: 0.0026 - val_kl:
0.3934 - val_loss: -1.1877 - val_nll: -1.2047
Epoch 1781/2000
6/6            4s 631ms/step - kl:
0.3930 - nll: -1.3810 - total_loss: -1.3650 - val_direction: 0.0030 - val_kl:
0.3938 - val_loss: -1.1614 - val_nll: -1.1786
Epoch 1782/2000
6/6            5s 824ms/step - kl:
0.3930 - nll: -1.3804 - total_loss: -1.3644 - val_direction: 0.0028 - val_kl:
0.3927 - val_loss: -1.1748 - val_nll: -1.1920
Epoch 1783/2000
6/6            5s 802ms/step - kl:
0.3913 - nll: -1.3815 - total_loss: -1.3657 - val_direction: 0.0027 - val_kl:
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0.3912 - val_loss: -1.1794 - val_nll: -1.1964
Epoch 1784/2000
6/6             4s 719ms/step - kl:
0.3919 - nll: -1.3828 - total_loss: -1.3669 - val_direction: 0.0029 - val_kl:
0.3945 - val_loss: -1.1695 - val_nll: -1.1868
Epoch 1785/2000
6/6             4s 645ms/step - kl:
0.3947 - nll: -1.3800 - total_loss: -1.3640 - val_direction: 0.0030 - val_kl:
0.3950 - val_loss: -1.1648 - val_nll: -1.1821
Epoch 1786/2000
6/6             4s 663ms/step - kl:
0.3932 - nll: -1.3827 - total_loss: -1.3668 - val_direction: 0.0024 - val_kl:
0.3919 - val_loss: -1.1994 - val_nll: -1.2162
Epoch 1787/2000
6/6             4s 642ms/step - kl:
0.3914 - nll: -1.3827 - total_loss: -1.3668 - val_direction: 0.0024 - val_kl:
0.3914 - val_loss: -1.1975 - val_nll: -1.2143
Epoch 1788/2000
6/6             4s 631ms/step - kl:
0.3910 - nll: -1.3853 - total_loss: -1.3695 - val_direction: 0.0027 - val_kl:
0.3917 - val_loss: -1.1761 - val_nll: -1.1931
Epoch 1789/2000
6/6             4s 631ms/step - kl:
0.3916 - nll: -1.3778 - total_loss: -1.3619 - val_direction: 0.0030 - val_kl:
0.3919 - val_loss: -1.1600 - val_nll: -1.1772
Epoch 1790/2000
6/6             4s 636ms/step - kl:
0.3903 - nll: -1.3815 - total_loss: -1.3657 - val_direction: 0.0023 - val_kl:
0.3901 - val_loss: -1.2057 - val_nll: -1.2225
Epoch 1791/2000
6/6             5s 803ms/step - kl:
0.3913 - nll: -1.3840 - total_loss: -1.3681 - val_direction: 0.0026 - val_kl:
0.3937 - val_loss: -1.1839 - val_nll: -1.2010
Epoch 1792/2000
6/6             5s 794ms/step - kl:
0.3939 - nll: -1.3811 - total_loss: -1.3651 - val_direction: 0.0031 - val_kl:
0.3955 - val_loss: -1.1596 - val_nll: -1.1769
Epoch 1793/2000
6/6             5s 839ms/step - kl:
0.3946 - nll: -1.3812 - total_loss: -1.3653 - val_direction: 0.0027 - val_kl:
0.3937 - val_loss: -1.1773 - val_nll: -1.1944
Epoch 1794/2000
6/6             4s 651ms/step - kl:
0.3918 - nll: -1.3821 - total_loss: -1.3663 - val_direction: 0.0024 - val_kl:
0.3910 - val_loss: -1.1949 - val_nll: -1.2117
Epoch 1795/2000
6/6             4s 652ms/step - kl:
0.3909 - nll: -1.3828 - total_loss: -1.3670 - val_direction: 0.0029 - val_kl:
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0.3928 - val_loss: -1.1676 - val_nll: -1.1848
Epoch 1796/2000
6/6            4s 636ms/step - kl:
0.3936 - nll: -1.3805 - total_loss: -1.3646 - val_direction: 0.0031 - val_kl:
0.3948 - val_loss: -1.1551 - val_nll: -1.1725
Epoch 1797/2000
6/6            4s 633ms/step - kl:
0.3940 - nll: -1.3798 - total_loss: -1.3638 - val_direction: 0.0027 - val_kl:
0.3939 - val_loss: -1.1824 - val_nll: -1.1995
Epoch 1798/2000
6/6            4s 635ms/step - kl:
0.3931 - nll: -1.3829 - total_loss: -1.3670 - val_direction: 0.0026 - val_kl:
0.3931 - val_loss: -1.1848 - val_nll: -1.2018
Epoch 1799/2000
6/6            4s 635ms/step - kl:
0.3930 - nll: -1.3813 - total_loss: -1.3654 - val_direction: 0.0027 - val_kl:
0.3929 - val_loss: -1.1837 - val_nll: -1.2008
Epoch 1800/2000
6/6            4s 739ms/step - kl:
0.3918 - nll: -1.3841 - total_loss: -1.3683 - val_direction: 0.0025 - val_kl:
0.3922 - val_loss: -1.1949 - val_nll: -1.2118
Epoch 1801/2000
6/6            5s 853ms/step - kl:
0.3926 - nll: -1.3829 - total_loss: -1.3670 - val_direction: 0.0029 - val_kl:
0.3941 - val_loss: -1.1684 - val_nll: -1.1856
Epoch 1802/2000
6/6            4s 711ms/step - kl:
0.3939 - nll: -1.3782 - total_loss: -1.3621 - val_direction: 0.0031 - val_kl:
0.3941 - val_loss: -1.1599 - val_nll: -1.1772
Epoch 1803/2000
6/6            4s 643ms/step - kl:
0.3924 - nll: -1.3805 - total_loss: -1.3647 - val_direction: 0.0024 - val_kl:
0.3905 - val_loss: -1.1990 - val_nll: -1.2158
Epoch 1804/2000
6/6            4s 644ms/step - kl:
0.3896 - nll: -1.3837 - total_loss: -1.3680 - val_direction: 0.0028 - val_kl:
0.3901 - val_loss: -1.1754 - val_nll: -1.1924
Epoch 1805/2000
6/6            4s 645ms/step - kl:
0.3906 - nll: -1.3800 - total_loss: -1.3641 - val_direction: 0.0033 - val_kl:
0.3918 - val_loss: -1.1478 - val_nll: -1.1652
Epoch 1806/2000
6/6            4s 636ms/step - kl:
0.3914 - nll: -1.3799 - total_loss: -1.3640 - val_direction: 0.0024 - val_kl:
0.3911 - val_loss: -1.1972 - val_nll: -1.2140
Epoch 1807/2000
6/6            4s 639ms/step - kl:
0.3905 - nll: -1.3836 - total_loss: -1.3678 - val_direction: 0.0025 - val_kl:
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0.3914 - val_loss: -1.1898 - val_nll: -1.2067
Epoch 1808/2000
6/6            4s 650ms/step - kl:
0.3919 - nll: -1.3823 - total_loss: -1.3664 - val_direction: 0.0029 - val_kl:
0.3934 - val_loss: -1.1697 - val_nll: -1.1869
Epoch 1809/2000
6/6            4s 636ms/step - kl:
0.3931 - nll: -1.3809 - total_loss: -1.3650 - val_direction: 0.0029 - val_kl:
0.3934 - val_loss: -1.1677 - val_nll: -1.1849
Epoch 1810/2000
6/6            5s 788ms/step - kl:
0.3920 - nll: -1.3824 - total_loss: -1.3666 - val_direction: 0.0025 - val_kl:
0.3907 - val_loss: -1.1898 - val_nll: -1.2067
Epoch 1811/2000
6/6            5s 794ms/step - kl:
0.3897 - nll: -1.3817 - total_loss: -1.3660 - val_direction: 0.0027 - val_kl:
0.3904 - val_loss: -1.1803 - val_nll: -1.1973
Epoch 1812/2000
6/6            4s 697ms/step - kl:
0.3907 - nll: -1.3822 - total_loss: -1.3663 - val_direction: 0.0026 - val_kl:
0.3919 - val_loss: -1.1866 - val_nll: -1.2036
Epoch 1813/2000
6/6            4s 649ms/step - kl:
0.3916 - nll: -1.3832 - total_loss: -1.3674 - val_direction: 0.0026 - val_kl:
0.3929 - val_loss: -1.1852 - val_nll: -1.2022
Epoch 1814/2000
6/6            4s 644ms/step - kl:
0.3933 - nll: -1.3803 - total_loss: -1.3644 - val_direction: 0.0031 - val_kl:
0.3939 - val_loss: -1.1541 - val_nll: -1.1714
Epoch 1815/2000
6/6            4s 654ms/step - kl:
0.3919 - nll: -1.3806 - total_loss: -1.3648 - val_direction: 0.0026 - val_kl:
0.3899 - val_loss: -1.1872 - val_nll: -1.2041
Epoch 1816/2000
6/6            4s 717ms/step - kl:
0.3890 - nll: -1.3821 - total_loss: -1.3663 - val_direction: 0.0023 - val_kl:
0.3887 - val_loss: -1.2052 - val_nll: -1.2219
Epoch 1817/2000
6/6            4s 714ms/step - kl:
0.3887 - nll: -1.3845 - total_loss: -1.3688 - val_direction: 0.0027 - val_kl:
0.3901 - val_loss: -1.1817 - val_nll: -1.1986
Epoch 1818/2000
6/6            4s 630ms/step - kl:
0.3897 - nll: -1.3804 - total_loss: -1.3646 - val_direction: 0.0027 - val_kl:
0.3895 - val_loss: -1.1806 - val_nll: -1.1976
Epoch 1819/2000
6/6            4s 633ms/step - kl:
0.3882 - nll: -1.3824 - total_loss: -1.3667 - val_direction: 0.0027 - val_kl:
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0.3876 - val_loss: -1.1776 - val_nll: -1.1944
Epoch 1820/2000
6/6            5s 794ms/step - kl:
0.3867 - nll: -1.3825 - total_loss: -1.3668 - val_direction: 0.0026 - val_kl:
0.3884 - val_loss: -1.1874 - val_nll: -1.2042
Epoch 1821/2000
6/6            5s 835ms/step - kl:
0.3893 - nll: -1.3838 - total_loss: -1.3680 - val_direction: 0.0028 - val_kl:
0.3917 - val_loss: -1.1760 - val_nll: -1.1931
Epoch 1822/2000
6/6            5s 766ms/step - kl:
0.3923 - nll: -1.3805 - total_loss: -1.3645 - val_direction: 0.0034 - val_kl:
0.3934 - val_loss: -1.1388 - val_nll: -1.1562
Epoch 1823/2000
6/6            4s 663ms/step - kl:
0.3917 - nll: -1.3771 - total_loss: -1.3612 - val_direction: 0.0029 - val_kl:
0.3888 - val_loss: -1.1735 - val_nll: -1.1905
Epoch 1824/2000
6/6            4s 645ms/step - kl:
0.3868 - nll: -1.3847 - total_loss: -1.3691 - val_direction: 0.0021 - val_kl:
0.3851 - val_loss: -1.2112 - val_nll: -1.2276
Epoch 1825/2000
6/6            4s 644ms/step - kl:
0.3842 - nll: -1.3845 - total_loss: -1.3689 - val_direction: 0.0027 - val_kl:
0.3859 - val_loss: -1.1799 - val_nll: -1.1967
Epoch 1826/2000
6/6            4s 712ms/step - kl:
0.3875 - nll: -1.3816 - total_loss: -1.3658 - val_direction: 0.0030 - val_kl:
0.3918 - val_loss: -1.1615 - val_nll: -1.1787
Epoch 1827/2000
6/6            4s 707ms/step - kl:
0.3925 - nll: -1.3800 - total_loss: -1.3641 - val_direction: 0.0026 - val_kl:
0.3933 - val_loss: -1.1841 - val_nll: -1.2012
Epoch 1828/2000
6/6            4s 630ms/step - kl:
0.3925 - nll: -1.3823 - total_loss: -1.3664 - val_direction: 0.0027 - val_kl:
0.3921 - val_loss: -1.1833 - val_nll: -1.2003
Epoch 1829/2000
6/6            4s 642ms/step - kl:
0.3909 - nll: -1.3821 - total_loss: -1.3663 - val_direction: 0.0027 - val_kl:
0.3892 - val_loss: -1.1815 - val_nll: -1.1984
Epoch 1830/2000
6/6            5s 831ms/step - kl:
0.3868 - nll: -1.3822 - total_loss: -1.3666 - val_direction: 0.0025 - val_kl:
0.3855 - val_loss: -1.1910 - val_nll: -1.2077
Epoch 1831/2000
6/6            5s 832ms/step - kl:
0.3859 - nll: -1.3855 - total_loss: -1.3699 - val_direction: 0.0021 - val_kl:
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0.3882 - val_loss: -1.2125 - val_nll: -1.2291
Epoch 1832/2000
6/6             4s 666ms/step - kl:
0.3886 - nll: -1.3831 - total_loss: -1.3674 - val_direction: 0.0034 - val_kl:
0.3903 - val_loss: -1.1391 - val_nll: -1.1564
Epoch 1833/2000
6/6             4s 667ms/step - kl:
0.3893 - nll: -1.3786 - total_loss: -1.3628 - val_direction: 0.0032 - val_kl:
0.3891 - val_loss: -1.1526 - val_nll: -1.1698
Epoch 1834/2000
6/6             4s 639ms/step - kl:
0.3871 - nll: -1.3809 - total_loss: -1.3653 - val_direction: 0.0023 - val_kl:
0.3843 - val_loss: -1.2061 - val_nll: -1.2226
Epoch 1835/2000
6/6             4s 644ms/step - kl:
0.3833 - nll: -1.3847 - total_loss: -1.3692 - val_direction: 0.0024 - val_kl:
0.3846 - val_loss: -1.1983 - val_nll: -1.2149
Epoch 1836/2000
6/6             4s 716ms/step - kl:
0.3861 - nll: -1.3800 - total_loss: -1.3642 - val_direction: 0.0031 - val_kl:
0.3894 - val_loss: -1.1552 - val_nll: -1.1723
Epoch 1837/2000
6/6             4s 737ms/step - kl:
0.3901 - nll: -1.3804 - total_loss: -1.3645 - val_direction: 0.0023 - val_kl:
0.3914 - val_loss: -1.2057 - val_nll: -1.2225
Epoch 1838/2000
6/6             4s 635ms/step - kl:
0.3910 - nll: -1.3843 - total_loss: -1.3685 - val_direction: 0.0025 - val_kl:
0.3911 - val_loss: -1.1892 - val_nll: -1.2061
Epoch 1839/2000
6/6             4s 636ms/step - kl:
0.3903 - nll: -1.3822 - total_loss: -1.3665 - val_direction: 0.0029 - val_kl:
0.3904 - val_loss: -1.1671 - val_nll: -1.1841
Epoch 1840/2000
6/6             4s 780ms/step - kl:
0.3897 - nll: -1.3800 - total_loss: -1.3642 - val_direction: 0.0028 - val_kl:
0.3897 - val_loss: -1.1740 - val_nll: -1.1910
Epoch 1841/2000
6/6             4s 727ms/step - kl:
0.3892 - nll: -1.3831 - total_loss: -1.3674 - val_direction: 0.0025 - val_kl:
0.3889 - val_loss: -1.1921 - val_nll: -1.2089
Epoch 1842/2000
6/6             4s 734ms/step - kl:
0.3871 - nll: -1.3825 - total_loss: -1.3669 - val_direction: 0.0028 - val_kl:
0.3862 - val_loss: -1.1764 - val_nll: -1.1932
Epoch 1843/2000
6/6             4s 644ms/step - kl:
0.3865 - nll: -1.3810 - total_loss: -1.3653 - val_direction: 0.0032 - val_kl:
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0.3887 - val_loss: -1.1498 - val_nll: -1.1669
Epoch 1844/2000
6/6            4s 655ms/step - kl:
0.3882 - nll: -1.3788 - total_loss: -1.3630 - val_direction: 0.0029 - val_kl:
0.3881 - val_loss: -1.1710 - val_nll: -1.1880
Epoch 1845/2000
6/6            4s 657ms/step - kl:
0.3871 - nll: -1.3827 - total_loss: -1.3671 - val_direction: 0.0023 - val_kl:
0.3866 - val_loss: -1.2003 - val_nll: -1.2169
Epoch 1846/2000
6/6            5s 809ms/step - kl:
0.3857 - nll: -1.3809 - total_loss: -1.3652 - val_direction: 0.0030 - val_kl:
0.3853 - val_loss: -1.1644 - val_nll: -1.1813
Epoch 1847/2000
6/6            4s 657ms/step - kl:
0.3849 - nll: -1.3798 - total_loss: -1.3642 - val_direction: 0.0027 - val_kl:
0.3860 - val_loss: -1.1856 - val_nll: -1.2024
Epoch 1848/2000
6/6            4s 677ms/step - kl:
0.3867 - nll: -1.3835 - total_loss: -1.3678 - val_direction: 0.0025 - val_kl:
0.3892 - val_loss: -1.1903 - val_nll: -1.2071
Epoch 1849/2000
6/6            4s 730ms/step - kl:
0.3899 - nll: -1.3825 - total_loss: -1.3666 - val_direction: 0.0029 - val_kl:
0.3909 - val_loss: -1.1692 - val_nll: -1.1863
Epoch 1850/2000
6/6            5s 819ms/step - kl:
0.3891 - nll: -1.3824 - total_loss: -1.3667 - val_direction: 0.0024 - val_kl:
0.3876 - val_loss: -1.2015 - val_nll: -1.2182
Epoch 1851/2000
6/6            4s 703ms/step - kl:
0.3867 - nll: -1.3833 - total_loss: -1.3677 - val_direction: 0.0026 - val_kl:
0.3871 - val_loss: -1.1844 - val_nll: -1.2012
Epoch 1852/2000
6/6            4s 663ms/step - kl:
0.3875 - nll: -1.3830 - total_loss: -1.3673 - val_direction: 0.0026 - val_kl:
0.3895 - val_loss: -1.1864 - val_nll: -1.2033
Epoch 1853/2000
6/6            4s 651ms/step - kl:
0.3896 - nll: -1.3813 - total_loss: -1.3655 - val_direction: 0.0027 - val_kl:
0.3892 - val_loss: -1.1766 - val_nll: -1.1935
Epoch 1854/2000
6/6            4s 647ms/step - kl:
0.3871 - nll: -1.3812 - total_loss: -1.3656 - val_direction: 0.0029 - val_kl:
0.3849 - val_loss: -1.1651 - val_nll: -1.1820
Epoch 1855/2000
6/6            4s 712ms/step - kl:
0.3835 - nll: -1.3801 - total_loss: -1.3646 - val_direction: 0.0029 - val_kl:
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0.3830 - val_loss: -1.1687 - val_nll: -1.1855
Epoch 1856/2000
6/6             4s 680ms/step - kl:
0.3826 - nll: -1.3802 - total_loss: -1.3647 - val_direction: 0.0026 - val_kl:
0.3841 - val_loss: -1.1835 - val_nll: -1.2002
Epoch 1857/2000
6/6             4s 629ms/step - kl:
0.3851 - nll: -1.3823 - total_loss: -1.3667 - val_direction: 0.0025 - val_kl:
0.3866 - val_loss: -1.1895 - val_nll: -1.2062
Epoch 1858/2000
6/6             4s 638ms/step - kl:
0.3868 - nll: -1.3832 - total_loss: -1.3676 - val_direction: 0.0027 - val_kl:
0.3884 - val_loss: -1.1812 - val_nll: -1.1981
Epoch 1859/2000
6/6             5s 874ms/step - kl:
0.3884 - nll: -1.3808 - total_loss: -1.3650 - val_direction: 0.0031 - val_kl:
0.3883 - val_loss: -1.1562 - val_nll: -1.1733
Epoch 1860/2000
6/6             5s 767ms/step - kl:
0.3857 - nll: -1.3804 - total_loss: -1.3648 - val_direction: 0.0024 - val_kl:
0.3837 - val_loss: -1.2017 - val_nll: -1.2183
Epoch 1861/2000
6/6             4s 643ms/step - kl:
0.3830 - nll: -1.3833 - total_loss: -1.3678 - val_direction: 0.0024 - val_kl:
0.3837 - val_loss: -1.1985 - val_nll: -1.2151
Epoch 1862/2000
6/6             4s 688ms/step - kl:
0.3845 - nll: -1.3819 - total_loss: -1.3663 - val_direction: 0.0030 - val_kl:
0.3873 - val_loss: -1.1665 - val_nll: -1.1835
Epoch 1863/2000
6/6             4s 643ms/step - kl:
0.3883 - nll: -1.3795 - total_loss: -1.3637 - val_direction: 0.0028 - val_kl:
0.3894 - val_loss: -1.1724 - val_nll: -1.1894
Epoch 1864/2000
6/6             4s 703ms/step - kl:
0.3875 - nll: -1.3823 - total_loss: -1.3667 - val_direction: 0.0024 - val_kl:
0.3852 - val_loss: -1.2022 - val_nll: -1.2187
Epoch 1865/2000
6/6             4s 665ms/step - kl:
0.3842 - nll: -1.3834 - total_loss: -1.3679 - val_direction: 0.0024 - val_kl:
0.3843 - val_loss: -1.1952 - val_nll: -1.2118
Epoch 1866/2000
6/6             5s 749ms/step - kl:
0.3845 - nll: -1.3838 - total_loss: -1.3682 - val_direction: 0.0029 - val_kl:
0.3861 - val_loss: -1.1713 - val_nll: -1.1882
Epoch 1867/2000
6/6             4s 643ms/step - kl:
0.3863 - nll: -1.3796 - total_loss: -1.3639 - val_direction: 0.0030 - val_kl:
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0.3875 - val_loss: -1.1619 - val_nll: -1.1790
Epoch 1868/2000
6/6            4s 719ms/step - kl:
0.3859 - nll: -1.3803 - total_loss: -1.3647 - val_direction: 0.0026 - val_kl:
0.3838 - val_loss: -1.1893 - val_nll: -1.2059
Epoch 1869/2000
6/6            5s 768ms/step - kl:
0.3829 - nll: -1.3842 - total_loss: -1.3687 - val_direction: 0.0024 - val_kl:
0.3832 - val_loss: -1.1998 - val_nll: -1.2163
Epoch 1870/2000
6/6            4s 654ms/step - kl:
0.3841 - nll: -1.3831 - total_loss: -1.3675 - val_direction: 0.0030 - val_kl:
0.3876 - val_loss: -1.1614 - val_nll: -1.1784
Epoch 1871/2000
6/6            4s 702ms/step - kl:
0.3880 - nll: -1.3791 - total_loss: -1.3633 - val_direction: 0.0030 - val_kl:
0.3887 - val_loss: -1.1637 - val_nll: -1.1807
Epoch 1872/2000
6/6            4s 644ms/step - kl:
0.3873 - nll: -1.3813 - total_loss: -1.3656 - val_direction: 0.0026 - val_kl:
0.3861 - val_loss: -1.1873 - val_nll: -1.2041
Epoch 1873/2000
6/6            4s 660ms/step - kl:
0.3843 - nll: -1.3829 - total_loss: -1.3674 - val_direction: 0.0027 - val_kl:
0.3828 - val_loss: -1.1781 - val_nll: -1.1947
Epoch 1874/2000
6/6            4s 639ms/step - kl:
0.3820 - nll: -1.3813 - total_loss: -1.3658 - val_direction: 0.0030 - val_kl:
0.3833 - val_loss: -1.1631 - val_nll: -1.1799
Epoch 1875/2000
6/6            4s 635ms/step - kl:
0.3839 - nll: -1.3805 - total_loss: -1.3649 - val_direction: 0.0026 - val_kl:
0.3855 - val_loss: -1.1896 - val_nll: -1.2063
Epoch 1876/2000
6/6            4s 636ms/step - kl:
0.3857 - nll: -1.3815 - total_loss: -1.3659 - val_direction: 0.0027 - val_kl:
0.3861 - val_loss: -1.1787 - val_nll: -1.1955
Epoch 1877/2000
6/6            4s 635ms/step - kl:
0.3857 - nll: -1.3807 - total_loss: -1.3651 - val_direction: 0.0028 - val_kl:
0.3866 - val_loss: -1.1767 - val_nll: -1.1936
Epoch 1878/2000
6/6            4s 745ms/step - kl:
0.3866 - nll: -1.3804 - total_loss: -1.3647 - val_direction: 0.0025 - val_kl:
0.3877 - val_loss: -1.1941 - val_nll: -1.2108
Epoch 1879/2000
6/6            4s 659ms/step - kl:
0.3880 - nll: -1.3812 - total_loss: -1.3654 - val_direction: 0.0027 - val_kl:
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0.3893 - val_loss: -1.1812 - val_nll: -1.1981
Epoch 1880/2000
6/6            4s 724ms/step - kl:
0.3890 - nll: -1.3824 - total_loss: -1.3667 - val_direction: 0.0026 - val_kl:
0.3893 - val_loss: -1.1851 - val_nll: -1.2020
Epoch 1881/2000
6/6            4s 663ms/step - kl:
0.3883 - nll: -1.3816 - total_loss: -1.3659 - val_direction: 0.0028 - val_kl:
0.3873 - val_loss: -1.1765 - val_nll: -1.1934
Epoch 1882/2000
6/6            4s 650ms/step - kl:
0.3864 - nll: -1.3815 - total_loss: -1.3659 - val_direction: 0.0025 - val_kl:
0.3856 - val_loss: -1.1918 - val_nll: -1.2085
Epoch 1883/2000
6/6            4s 640ms/step - kl:
0.3846 - nll: -1.3839 - total_loss: -1.3684 - val_direction: 0.0024 - val_kl:
0.3841 - val_loss: -1.1966 - val_nll: -1.2132
Epoch 1884/2000
6/6            4s 634ms/step - kl:
0.3831 - nll: -1.3829 - total_loss: -1.3674 - val_direction: 0.0027 - val_kl:
0.3825 - val_loss: -1.1787 - val_nll: -1.1954
Epoch 1885/2000
6/6            4s 733ms/step - kl:
0.3820 - nll: -1.3817 - total_loss: -1.3662 - val_direction: 0.0029 - val_kl:
0.3829 - val_loss: -1.1728 - val_nll: -1.1895
Epoch 1886/2000
6/6            4s 632ms/step - kl:
0.3833 - nll: -1.3792 - total_loss: -1.3636 - val_direction: 0.0028 - val_kl:
0.3850 - val_loss: -1.1707 - val_nll: -1.1875
Epoch 1887/2000
6/6            4s 719ms/step - kl:
0.3845 - nll: -1.3805 - total_loss: -1.3649 - val_direction: 0.0026 - val_kl:
0.3846 - val_loss: -1.1902 - val_nll: -1.2068
Epoch 1888/2000
6/6            5s 819ms/step - kl:
0.3842 - nll: -1.3835 - total_loss: -1.3679 - val_direction: 0.0025 - val_kl:
0.3848 - val_loss: -1.1905 - val_nll: -1.2072
Epoch 1889/2000
6/6            4s 735ms/step - kl:
0.3858 - nll: -1.3807 - total_loss: -1.3650 - val_direction: 0.0031 - val_kl:
0.3876 - val_loss: -1.1583 - val_nll: -1.1754
Epoch 1890/2000
6/6            4s 640ms/step - kl:
0.3868 - nll: -1.3806 - total_loss: -1.3650 - val_direction: 0.0027 - val_kl:
0.3864 - val_loss: -1.1814 - val_nll: -1.1982
Epoch 1891/2000
6/6            4s 641ms/step - kl:
0.3856 - nll: -1.3825 - total_loss: -1.3669 - val_direction: 0.0024 - val_kl:
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0.3856 - val_loss: -1.2004 - val_nll: -1.2170
Epoch 1892/2000
6/6            4s 648ms/step - kl:
0.3851 - nll: -1.3833 - total_loss: -1.3678 - val_direction: 0.0028 - val_kl:
0.3853 - val_loss: -1.1748 - val_nll: -1.1917
Epoch 1893/2000
6/6            4s 629ms/step - kl:
0.3851 - nll: -1.3806 - total_loss: -1.3650 - val_direction: 0.0029 - val_kl:
0.3859 - val_loss: -1.1704 - val_nll: -1.1873
Epoch 1894/2000
6/6            4s 710ms/step - kl:
0.3858 - nll: -1.3813 - total_loss: -1.3657 - val_direction: 0.0027 - val_kl:
0.3864 - val_loss: -1.1814 - val_nll: -1.1982
Epoch 1895/2000
6/6            4s 636ms/step - kl:
0.3857 - nll: -1.3829 - total_loss: -1.3673 - val_direction: 0.0027 - val_kl:
0.3855 - val_loss: -1.1767 - val_nll: -1.1934
Epoch 1896/2000
6/6            4s 650ms/step - kl:
0.3846 - nll: -1.3812 - total_loss: -1.3657 - val_direction: 0.0028 - val_kl:
0.3840 - val_loss: -1.1711 - val_nll: -1.1878
Epoch 1897/2000
6/6            4s 750ms/step - kl:
0.3820 - nll: -1.3808 - total_loss: -1.3654 - val_direction: 0.0026 - val_kl:
0.3805 - val_loss: -1.1912 - val_nll: -1.2077
Epoch 1898/2000
6/6            4s 732ms/step - kl:
0.3799 - nll: -1.3822 - total_loss: -1.3668 - val_direction: 0.0023 - val_kl:
0.3811 - val_loss: -1.2029 - val_nll: -1.2193
Epoch 1899/2000
6/6            4s 743ms/step - kl:
0.3826 - nll: -1.3836 - total_loss: -1.3681 - val_direction: 0.0028 - val_kl:
0.3852 - val_loss: -1.1744 - val_nll: -1.1912
Epoch 1900/2000
6/6            4s 645ms/step - kl:
0.3843 - nll: -1.3791 - total_loss: -1.3635 - val_direction: 0.0031 - val_kl:
0.3844 - val_loss: -1.1562 - val_nll: -1.1731
Epoch 1901/2000
6/6            4s 638ms/step - kl:
0.3843 - nll: -1.3799 - total_loss: -1.3643 - val_direction: 0.0026 - val_kl:
0.3840 - val_loss: -1.1857 - val_nll: -1.2024
Epoch 1902/2000
6/6            4s 649ms/step - kl:
0.3820 - nll: -1.3820 - total_loss: -1.3666 - val_direction: 0.0025 - val_kl:
0.3809 - val_loss: -1.1930 - val_nll: -1.2095
Epoch 1903/2000
6/6            4s 647ms/step - kl:
0.3810 - nll: -1.3825 - total_loss: -1.3670 - val_direction: 0.0029 - val_kl:
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0.3828 - val_loss: -1.1695 - val_nll: -1.1863
Epoch 1904/2000
6/6            4s 722ms/step - kl:
0.3831 - nll: -1.3807 - total_loss: -1.3651 - val_direction: 0.0028 - val_kl:
0.3845 - val_loss: -1.1721 - val_nll: -1.1889
Epoch 1905/2000
6/6            4s 633ms/step - kl:
0.3843 - nll: -1.3800 - total_loss: -1.3644 - val_direction: 0.0029 - val_kl:
0.3844 - val_loss: -1.1686 - val_nll: -1.1854
Epoch 1906/2000
6/6            4s 726ms/step - kl:
0.3829 - nll: -1.3822 - total_loss: -1.3667 - val_direction: 0.0026 - val_kl:
0.3833 - val_loss: -1.1855 - val_nll: -1.2022
Epoch 1907/2000
6/6            5s 800ms/step - kl:
0.3840 - nll: -1.3817 - total_loss: -1.3661 - val_direction: 0.0028 - val_kl:
0.3853 - val_loss: -1.1753 - val_nll: -1.1921
Epoch 1908/2000
6/6            4s 678ms/step - kl:
0.3845 - nll: -1.3797 - total_loss: -1.3641 - val_direction: 0.0025 - val_kl:
0.3839 - val_loss: -1.1930 - val_nll: -1.2097
Epoch 1909/2000
6/6            4s 648ms/step - kl:
0.3824 - nll: -1.3844 - total_loss: -1.3690 - val_direction: 0.0022 - val_kl:
0.3809 - val_loss: -1.2094 - val_nll: -1.2257
Epoch 1910/2000
6/6            4s 652ms/step - kl:
0.3804 - nll: -1.3840 - total_loss: -1.3686 - val_direction: 0.0026 - val_kl:
0.3807 - val_loss: -1.1823 - val_nll: -1.1989
Epoch 1911/2000
6/6            4s 664ms/step - kl:
0.3813 - nll: -1.3826 - total_loss: -1.3671 - val_direction: 0.0032 - val_kl:
0.3832 - val_loss: -1.1524 - val_nll: -1.1694
Epoch 1912/2000
6/6            4s 632ms/step - kl:
0.3829 - nll: -1.3767 - total_loss: -1.3611 - val_direction: 0.0031 - val_kl:
0.3824 - val_loss: -1.1601 - val_nll: -1.1769
Epoch 1913/2000
6/6            4s 633ms/step - kl:
0.3804 - nll: -1.3813 - total_loss: -1.3660 - val_direction: 0.0022 - val_kl:
0.3786 - val_loss: -1.2133 - val_nll: -1.2295
Epoch 1914/2000
6/6            4s 632ms/step - kl:
0.3781 - nll: -1.3846 - total_loss: -1.3693 - val_direction: 0.0025 - val_kl:
0.3791 - val_loss: -1.1878 - val_nll: -1.2042
Epoch 1915/2000
6/6            4s 726ms/step - kl:
0.3796 - nll: -1.3818 - total_loss: -1.3663 - val_direction: 0.0028 - val_kl:
```

```
0.3819 - val_loss: -1.1737 - val_nll: -1.1903
Epoch 1916/2000
6/6            5s 721ms/step - kl:
0.3813 - nll: -1.3823 - total_loss: -1.3669 - val_direction: 0.0023 - val_kl:
0.3812 - val_loss: -1.1991 - val_nll: -1.2156
Epoch 1917/2000
6/6            4s 645ms/step - kl:
0.3809 - nll: -1.3831 - total_loss: -1.3677 - val_direction: 0.0026 - val_kl:
0.3812 - val_loss: -1.1848 - val_nll: -1.2013
Epoch 1918/2000
6/6            4s 719ms/step - kl:
0.3806 - nll: -1.3815 - total_loss: -1.3661 - val_direction: 0.0027 - val_kl:
0.3803 - val_loss: -1.1796 - val_nll: -1.1962
Epoch 1919/2000
6/6            4s 644ms/step - kl:
0.3793 - nll: -1.3830 - total_loss: -1.3677 - val_direction: 0.0025 - val_kl:
0.3780 - val_loss: -1.1971 - val_nll: -1.2134
Epoch 1920/2000
6/6            4s 639ms/step - kl:
0.3773 - nll: -1.3832 - total_loss: -1.3679 - val_direction: 0.0027 - val_kl:
0.3778 - val_loss: -1.1822 - val_nll: -1.1987
Epoch 1921/2000
6/6            4s 635ms/step - kl:
0.3769 - nll: -1.3794 - total_loss: -1.3641 - val_direction: 0.0030 - val_kl:
0.3774 - val_loss: -1.1616 - val_nll: -1.1782
Epoch 1922/2000
6/6            4s 631ms/step - kl:
0.3777 - nll: -1.3787 - total_loss: -1.3633 - val_direction: 0.0025 - val_kl:
0.3802 - val_loss: -1.1943 - val_nll: -1.2107
Epoch 1923/2000
6/6            4s 632ms/step - kl:
0.3807 - nll: -1.3831 - total_loss: -1.3677 - val_direction: 0.0025 - val_kl:
0.3820 - val_loss: -1.1871 - val_nll: -1.2036
Epoch 1924/2000
6/6            4s 732ms/step - kl:
0.3812 - nll: -1.3831 - total_loss: -1.3677 - val_direction: 0.0026 - val_kl:
0.3810 - val_loss: -1.1849 - val_nll: -1.2014
Epoch 1925/2000
6/6            5s 807ms/step - kl:
0.3804 - nll: -1.3816 - total_loss: -1.3663 - val_direction: 0.0029 - val_kl:
0.3802 - val_loss: -1.1693 - val_nll: -1.1860
Epoch 1926/2000
6/6            4s 718ms/step - kl:
0.3794 - nll: -1.3808 - total_loss: -1.3655 - val_direction: 0.0027 - val_kl:
0.3790 - val_loss: -1.1812 - val_nll: -1.1977
Epoch 1927/2000
6/6            4s 643ms/step - kl:
0.3790 - nll: -1.3831 - total_loss: -1.3677 - val_direction: 0.0023 - val_kl:
```

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0.3809 - val_loss: -1.2069 - val_nll: -1.2233
Epoch 1928/2000
6/6            4s 640ms/step - kl:
0.3818 - nll: -1.3829 - total_loss: -1.3674 - val_direction: 0.0027 - val_kl:
0.3843 - val_loss: -1.1749 - val_nll: -1.1917
Epoch 1929/2000
6/6            4s 640ms/step - kl:
0.3841 - nll: -1.3808 - total_loss: -1.3652 - val_direction: 0.0030 - val_kl:
0.3837 - val_loss: -1.1643 - val_nll: -1.1811
Epoch 1930/2000
6/6            4s 627ms/step - kl:
0.3808 - nll: -1.3816 - total_loss: -1.3663 - val_direction: 0.0028 - val_kl:
0.3771 - val_loss: -1.1759 - val_nll: -1.1924
Epoch 1931/2000
6/6            4s 633ms/step - kl:
0.3752 - nll: -1.3828 - total_loss: -1.3677 - val_direction: 0.0027 - val_kl:
0.3741 - val_loss: -1.1823 - val_nll: -1.1986
Epoch 1932/2000
6/6            4s 633ms/step - kl:
0.3751 - nll: -1.3824 - total_loss: -1.3671 - val_direction: 0.0026 - val_kl:
0.3784 - val_loss: -1.1881 - val_nll: -1.2045
Epoch 1933/2000
6/6            4s 657ms/step - kl:
0.3793 - nll: -1.3811 - total_loss: -1.3656 - val_direction: 0.0030 - val_kl:
0.3824 - val_loss: -1.1628 - val_nll: -1.1796
Epoch 1934/2000
6/6            5s 826ms/step - kl:
0.3831 - nll: -1.3765 - total_loss: -1.3608 - val_direction: 0.0030 - val_kl:
0.3840 - val_loss: -1.1665 - val_nll: -1.1833
Epoch 1935/2000
6/6            4s 672ms/step - kl:
0.3822 - nll: -1.3820 - total_loss: -1.3666 - val_direction: 0.0022 - val_kl:
0.3803 - val_loss: -1.2093 - val_nll: -1.2256
Epoch 1936/2000
6/6            4s 650ms/step - kl:
0.3796 - nll: -1.3846 - total_loss: -1.3692 - val_direction: 0.0025 - val_kl:
0.3806 - val_loss: -1.1910 - val_nll: -1.2075
Epoch 1937/2000
6/6            4s 642ms/step - kl:
0.3804 - nll: -1.3845 - total_loss: -1.3691 - val_direction: 0.0029 - val_kl:
0.3810 - val_loss: -1.1687 - val_nll: -1.1854
Epoch 1938/2000
6/6            4s 646ms/step - kl:
0.3801 - nll: -1.3814 - total_loss: -1.3660 - val_direction: 0.0029 - val_kl:
0.3794 - val_loss: -1.1643 - val_nll: -1.1810
Epoch 1939/2000
6/6            4s 642ms/step - kl:
0.3782 - nll: -1.3815 - total_loss: -1.3662 - val_direction: 0.0026 - val_kl:
```

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0.3770 - val_loss: -1.1893 - val_nll: -1.2056
Epoch 1940/2000
6/6            4s 639ms/step - kl:
0.3771 - nll: -1.3830 - total_loss: -1.3677 - val_direction: 0.0026 - val_kl:
0.3797 - val_loss: -1.1850 - val_nll: -1.2015
Epoch 1941/2000
6/6            4s 674ms/step - kl:
0.3805 - nll: -1.3802 - total_loss: -1.3647 - val_direction: 0.0031 - val_kl:
0.3828 - val_loss: -1.1551 - val_nll: -1.1720
Epoch 1942/2000
6/6            4s 639ms/step - kl:
0.3820 - nll: -1.3790 - total_loss: -1.3635 - val_direction: 0.0028 - val_kl:
0.3823 - val_loss: -1.1774 - val_nll: -1.1940
Epoch 1943/2000
6/6            5s 782ms/step - kl:
0.3824 - nll: -1.3822 - total_loss: -1.3667 - val_direction: 0.0025 - val_kl:
0.3827 - val_loss: -1.1882 - val_nll: -1.2047
Epoch 1944/2000
6/6            4s 678ms/step - kl:
0.3820 - nll: -1.3826 - total_loss: -1.3672 - val_direction: 0.0028 - val_kl:
0.3823 - val_loss: -1.1774 - val_nll: -1.1940
Epoch 1945/2000
6/6            4s 715ms/step - kl:
0.3822 - nll: -1.3817 - total_loss: -1.3662 - val_direction: 0.0028 - val_kl:
0.3831 - val_loss: -1.1747 - val_nll: -1.1914
Epoch 1946/2000
6/6            4s 646ms/step - kl:
0.3827 - nll: -1.3815 - total_loss: -1.3660 - val_direction: 0.0026 - val_kl:
0.3824 - val_loss: -1.1865 - val_nll: -1.2031
Epoch 1947/2000
6/6            4s 643ms/step - kl:
0.3809 - nll: -1.3823 - total_loss: -1.3669 - val_direction: 0.0029 - val_kl:
0.3806 - val_loss: -1.1724 - val_nll: -1.1890
Epoch 1948/2000
6/6            4s 666ms/step - kl:
0.3788 - nll: -1.3806 - total_loss: -1.3653 - val_direction: 0.0028 - val_kl:
0.3769 - val_loss: -1.1758 - val_nll: -1.1923
Epoch 1949/2000
6/6            4s 634ms/step - kl:
0.3752 - nll: -1.3816 - total_loss: -1.3664 - val_direction: 0.0024 - val_kl:
0.3746 - val_loss: -1.1965 - val_nll: -1.2127
Epoch 1950/2000
6/6            4s 631ms/step - kl:
0.3756 - nll: -1.3838 - total_loss: -1.3686 - val_direction: 0.0027 - val_kl:
0.3791 - val_loss: -1.1765 - val_nll: -1.1930
Epoch 1951/2000
6/6            4s 635ms/step - kl:
0.3802 - nll: -1.3817 - total_loss: -1.3662 - val_direction: 0.0032 - val_kl:
```

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0.3826 - val_loss: -1.1514 - val_nll: -1.1683
Epoch 1952/2000
6/6            4s 689ms/step - kl:
0.3819 - nll: -1.3780 - total_loss: -1.3625 - val_direction: 0.0028 - val_kl:
0.3808 - val_loss: -1.1764 - val_nll: -1.1930
Epoch 1953/2000
6/6            4s 693ms/step - kl:
0.3787 - nll: -1.3834 - total_loss: -1.3681 - val_direction: 0.0022 - val_kl:
0.3765 - val_loss: -1.2099 - val_nll: -1.2260
Epoch 1954/2000
6/6            4s 686ms/step - kl:
0.3761 - nll: -1.3841 - total_loss: -1.3689 - val_direction: 0.0026 - val_kl:
0.3767 - val_loss: -1.1875 - val_nll: -1.2038
Epoch 1955/2000
6/6            4s 759ms/step - kl:
0.3767 - nll: -1.3806 - total_loss: -1.3652 - val_direction: 0.0029 - val_kl:
0.3789 - val_loss: -1.1692 - val_nll: -1.1859
Epoch 1956/2000
6/6            4s 661ms/step - kl:
0.3801 - nll: -1.3816 - total_loss: -1.3662 - val_direction: 0.0027 - val_kl:
0.3821 - val_loss: -1.1802 - val_nll: -1.1968
Epoch 1957/2000
6/6            4s 641ms/step - kl:
0.3813 - nll: -1.3824 - total_loss: -1.3670 - val_direction: 0.0026 - val_kl:
0.3811 - val_loss: -1.1861 - val_nll: -1.2026
Epoch 1958/2000
6/6            4s 638ms/step - kl:
0.3804 - nll: -1.3831 - total_loss: -1.3677 - val_direction: 0.0027 - val_kl:
0.3806 - val_loss: -1.1798 - val_nll: -1.1963
Epoch 1959/2000
6/6            4s 658ms/step - kl:
0.3796 - nll: -1.3798 - total_loss: -1.3644 - val_direction: 0.0031 - val_kl:
0.3788 - val_loss: -1.1545 - val_nll: -1.1712
Epoch 1960/2000
6/6            4s 650ms/step - kl:
0.3765 - nll: -1.3806 - total_loss: -1.3654 - val_direction: 0.0024 - val_kl:
0.3746 - val_loss: -1.2012 - val_nll: -1.2174
Epoch 1961/2000
6/6            4s 634ms/step - kl:
0.3752 - nll: -1.3829 - total_loss: -1.3676 - val_direction: 0.0027 - val_kl:
0.3782 - val_loss: -1.1803 - val_nll: -1.1967
Epoch 1962/2000
6/6            4s 763ms/step - kl:
0.3785 - nll: -1.3832 - total_loss: -1.3678 - val_direction: 0.0030 - val_kl:
0.3800 - val_loss: -1.1625 - val_nll: -1.1792
Epoch 1963/2000
6/6            5s 767ms/step - kl:
0.3800 - nll: -1.3785 - total_loss: -1.3630 - val_direction: 0.0028 - val_kl:
```

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0.3812 - val_loss: -1.1742 - val_nll: -1.1909
Epoch 1964/2000
6/6             4s 726ms/step - kl:
0.3804 - nll: -1.3816 - total_loss: -1.3663 - val_direction: 0.0024 - val_kl:
0.3797 - val_loss: -1.1971 - val_nll: -1.2135
Epoch 1965/2000
6/6             4s 639ms/step - kl:
0.3794 - nll: -1.3820 - total_loss: -1.3666 - val_direction: 0.0028 - val_kl:
0.3802 - val_loss: -1.1770 - val_nll: -1.1936
Epoch 1966/2000
6/6             4s 646ms/step - kl:
0.3803 - nll: -1.3820 - total_loss: -1.3666 - val_direction: 0.0028 - val_kl:
0.3810 - val_loss: -1.1772 - val_nll: -1.1938
Epoch 1967/2000
6/6             4s 634ms/step - kl:
0.3796 - nll: -1.3800 - total_loss: -1.3646 - val_direction: 0.0028 - val_kl:
0.3785 - val_loss: -1.1725 - val_nll: -1.1891
Epoch 1968/2000
6/6             4s 632ms/step - kl:
0.3764 - nll: -1.3824 - total_loss: -1.3672 - val_direction: 0.0022 - val_kl:
0.3751 - val_loss: -1.2129 - val_nll: -1.2290
Epoch 1969/2000
6/6             4s 631ms/step - kl:
0.3760 - nll: -1.3837 - total_loss: -1.3684 - val_direction: 0.0029 - val_kl:
0.3794 - val_loss: -1.1672 - val_nll: -1.1838
Epoch 1970/2000
6/6             4s 636ms/step - kl:
0.3803 - nll: -1.3796 - total_loss: -1.3641 - val_direction: 0.0034 - val_kl:
0.3806 - val_loss: -1.1403 - val_nll: -1.1572
Epoch 1971/2000
6/6             5s 776ms/step - kl:
0.3772 - nll: -1.3803 - total_loss: -1.3651 - val_direction: 0.0022 - val_kl:
0.3731 - val_loss: -1.2102 - val_nll: -1.2263
Epoch 1972/2000
6/6             4s 705ms/step - kl:
0.3721 - nll: -1.3848 - total_loss: -1.3697 - val_direction: 0.0023 - val_kl:
0.3732 - val_loss: -1.2055 - val_nll: -1.2215
Epoch 1973/2000
6/6             4s 639ms/step - kl:
0.3746 - nll: -1.3819 - total_loss: -1.3667 - val_direction: 0.0029 - val_kl:
0.3787 - val_loss: -1.1682 - val_nll: -1.1848
Epoch 1974/2000
6/6             4s 727ms/step - kl:
0.3799 - nll: -1.3806 - total_loss: -1.3651 - val_direction: 0.0026 - val_kl:
0.3811 - val_loss: -1.1876 - val_nll: -1.2042
Epoch 1975/2000
6/6             4s 643ms/step - kl:
0.3790 - nll: -1.3827 - total_loss: -1.3674 - val_direction: 0.0025 - val_kl:
```

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0.3764 - val_loss: -1.1915 - val_nll: -1.2078
Epoch 1976/2000
6/6            4s 643ms/step - kl:
0.3750 - nll: -1.3836 - total_loss: -1.3685 - val_direction: 0.0025 - val_kl:
0.3745 - val_loss: -1.1904 - val_nll: -1.2066
Epoch 1977/2000
6/6            4s 636ms/step - kl:
0.3749 - nll: -1.3827 - total_loss: -1.3675 - val_direction: 0.0028 - val_kl:
0.3767 - val_loss: -1.1760 - val_nll: -1.1924
Epoch 1978/2000
6/6            4s 717ms/step - kl:
0.3770 - nll: -1.3820 - total_loss: -1.3667 - val_direction: 0.0031 - val_kl:
0.3788 - val_loss: -1.1596 - val_nll: -1.1763
Epoch 1979/2000
6/6            4s 635ms/step - kl:
0.3795 - nll: -1.3794 - total_loss: -1.3640 - val_direction: 0.0029 - val_kl:
0.3803 - val_loss: -1.1675 - val_nll: -1.1842
Epoch 1980/2000
6/6            4s 631ms/step - kl:
0.3787 - nll: -1.3819 - total_loss: -1.3667 - val_direction: 0.0026 - val_kl:
0.3761 - val_loss: -1.1890 - val_nll: -1.2053
Epoch 1981/2000
6/6            4s 731ms/step - kl:
0.3740 - nll: -1.3834 - total_loss: -1.3683 - val_direction: 0.0025 - val_kl:
0.3730 - val_loss: -1.1929 - val_nll: -1.2090
Epoch 1982/2000
6/6            4s 699ms/step - kl:
0.3725 - nll: -1.3824 - total_loss: -1.3673 - val_direction: 0.0026 - val_kl:
0.3734 - val_loss: -1.1872 - val_nll: -1.2035
Epoch 1983/2000
6/6            4s 730ms/step - kl:
0.3751 - nll: -1.3833 - total_loss: -1.3680 - val_direction: 0.0027 - val_kl:
0.3787 - val_loss: -1.1778 - val_nll: -1.1943
Epoch 1984/2000
6/6            4s 651ms/step - kl:
0.3791 - nll: -1.3778 - total_loss: -1.3624 - val_direction: 0.0032 - val_kl:
0.3798 - val_loss: -1.1507 - val_nll: -1.1675
Epoch 1985/2000
6/6            4s 715ms/step - kl:
0.3778 - nll: -1.3799 - total_loss: -1.3646 - val_direction: 0.0024 - val_kl:
0.3743 - val_loss: -1.1989 - val_nll: -1.2150
Epoch 1986/2000
6/6            4s 695ms/step - kl:
0.3717 - nll: -1.3831 - total_loss: -1.3681 - val_direction: 0.0026 - val_kl:
0.3709 - val_loss: -1.1853 - val_nll: -1.2014
Epoch 1987/2000
6/6            4s 651ms/step - kl:
0.3715 - nll: -1.3829 - total_loss: -1.3678 - val_direction: 0.0026 - val_kl:
```

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0.3748 - val_loss: -1.1871 - val_nll: -1.2034
Epoch 1988/2000
6/6            4s 648ms/step - kl:
0.3769 - nll: -1.3823 - total_loss: -1.3669 - val_direction: 0.0027 - val_kl:
0.3805 - val_loss: -1.1803 - val_nll: -1.1969
Epoch 1989/2000
6/6            4s 689ms/step - kl:
0.3799 - nll: -1.3815 - total_loss: -1.3662 - val_direction: 0.0026 - val_kl:
0.3789 - val_loss: -1.1852 - val_nll: -1.2017
Epoch 1990/2000
6/6            4s 643ms/step - kl:
0.3771 - nll: -1.3817 - total_loss: -1.3665 - val_direction: 0.0026 - val_kl:
0.3750 - val_loss: -1.1880 - val_nll: -1.2043
Epoch 1991/2000
6/6            4s 636ms/step - kl:
0.3738 - nll: -1.3804 - total_loss: -1.3653 - val_direction: 0.0028 - val_kl:
0.3734 - val_loss: -1.1724 - val_nll: -1.1887
Epoch 1992/2000
6/6            4s 644ms/step - kl:
0.3731 - nll: -1.3835 - total_loss: -1.3684 - val_direction: 0.0023 - val_kl:
0.3744 - val_loss: -1.2042 - val_nll: -1.2203
Epoch 1993/2000
6/6            5s 851ms/step - kl:
0.3751 - nll: -1.3828 - total_loss: -1.3676 - val_direction: 0.0030 - val_kl:
0.3776 - val_loss: -1.1630 - val_nll: -1.1796
Epoch 1994/2000
6/6            4s 657ms/step - kl:
0.3778 - nll: -1.3802 - total_loss: -1.3648 - val_direction: 0.0030 - val_kl:
0.3782 - val_loss: -1.1666 - val_nll: -1.1832
Epoch 1995/2000
6/6            4s 696ms/step - kl:
0.3763 - nll: -1.3794 - total_loss: -1.3642 - val_direction: 0.0027 - val_kl:
0.3749 - val_loss: -1.1837 - val_nll: -1.2001
Epoch 1996/2000
6/6            4s 710ms/step - kl:
0.3740 - nll: -1.3799 - total_loss: -1.3647 - val_direction: 0.0027 - val_kl:
0.3743 - val_loss: -1.1790 - val_nll: -1.1954
Epoch 1997/2000
6/6            4s 644ms/step - kl:
0.3748 - nll: -1.3824 - total_loss: -1.3672 - val_direction: 0.0026 - val_kl:
0.3780 - val_loss: -1.1897 - val_nll: -1.2061
Epoch 1998/2000
6/6            4s 640ms/step - kl:
0.3799 - nll: -1.3826 - total_loss: -1.3672 - val_direction: 0.0028 - val_kl:
0.3828 - val_loss: -1.1750 - val_nll: -1.1917
Epoch 1999/2000
6/6            4s 651ms/step - kl:
0.3815 - nll: -1.3803 - total_loss: -1.3648 - val_direction: 0.0028 - val_kl:
```

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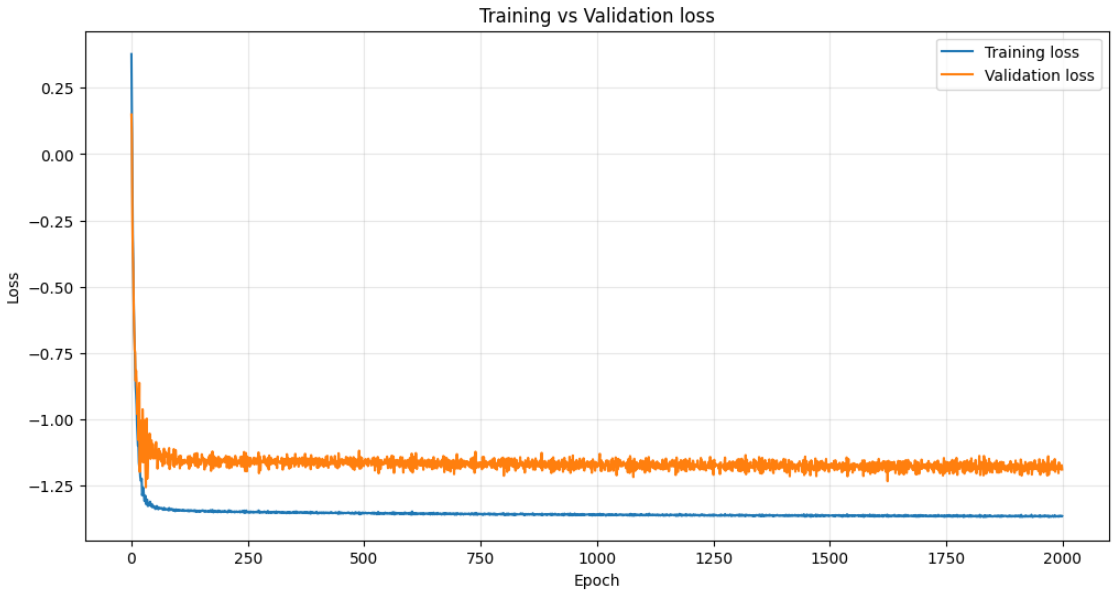
0.3795 - val_loss: -1.1740 - val_nll: -1.1906
Epoch 2000/2000
6/6             4s 647ms/step - kl:
0.3774 - nll: -1.3810 - total_loss: -1.3658 - val_direction: 0.0025 - val_kl:
0.3768 - val_loss: -1.1901 - val_nll: -1.2064
Evaluating on test set…
56/56             1s 18ms/step -
direction: 0.0000e+00 - kl: 0.3768 - loss: -1.9424 - nll: -1.9574
```

[34]:
```python
#plot training and validation loss
import matplotlib.pyplot as plt

plt.figure(figsize=(12, 6))
plt.plot(history.history['total_loss'], label='Training loss')
plt.plot(history.history['val_loss'], label='Validation loss')
plt.xlabel('Epoch')
plt.ylabel('Loss')
plt.legend()
plt.title('Training vs Validation loss')
plt.grid(True, alpha=0.3)
plt.show()
```



0.2.6 2.6 Monthly rebalanced backtest

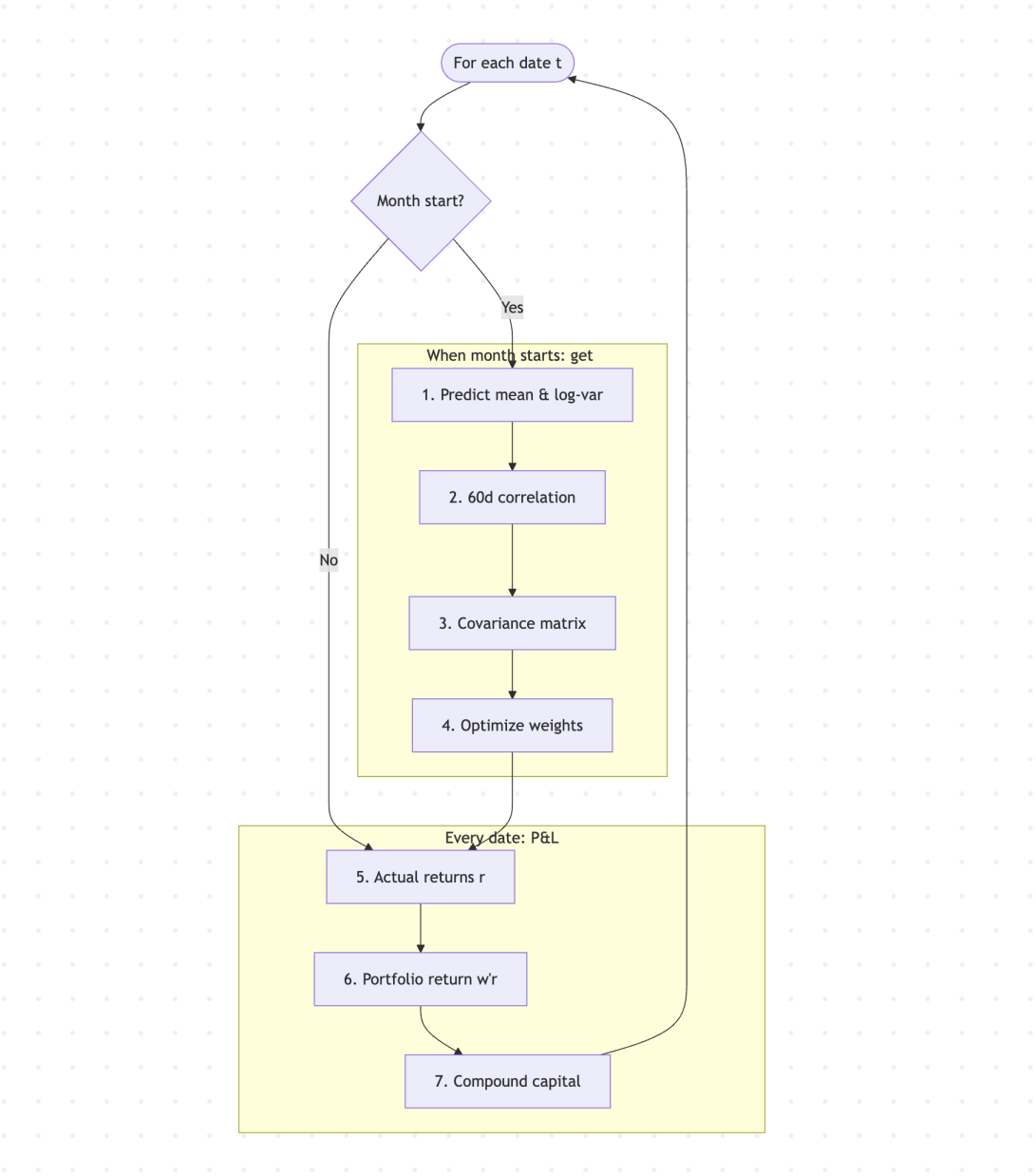


Figure Monthly allocation logic

Backtest logic (monthly rebalance)

We loop over each date in the backtest window. On **month-start** dates we rebalance (predict → covariance → optimize). **Every day** we apply current weights to that day's returns and compound capital. No look-ahead: correlation uses only the past 60 days; predictions use data up to `current_date`.

1. Initialization - Capital $C_0 = 1$; equal weights $w_0 = (1/n, \ldots, 1/n)$. - Dates: same as `dates` from `create_tensors`.

2. Rebalance (month start only)
Trigger: first date ($t = 0$) or when the calendar month changes ($\texttt{month}_{t-1} \neq \texttt{month}_t$). - **Predict:** Input X_t (shape: assets × lookback × features) → model outputs mean log-return $\hat{\mu}$ and log-variance $\log \hat{\sigma}^2$ per asset. - **Volatilities:** $\hat{\sigma}_j = \exp(0.5 \cdot \log \hat{\sigma}_j^2)$. - **Correlation:** Past 60 trading days of actual log returns (strictly before `current_date`) → sample correlation matrix Σ_{corr}. - **Covariance:** $\hat{\Sigma} = D\Sigma_{\text{corr}}D$ with $D = \text{diag}(\hat{\sigma}_1, \ldots, \hat{\sigma}_n)$. - **Weights:** Solve return vs. max-drawdown → w_t; hold until next month start.

3. Daily P&L (every date)
Using current weights w_t (fixed since last rebalance): - Actual log-returns: $r_{j,t}$ from `feature_df.loc[current_date, asset_ret_cols]`. - Portfolio log-return: $R_{p,t} = \sum_j w_{j,t} r_{j,t}$. - Compound: $C_{t+1} = C_t \cdot \exp(R_{p,t})$.

4. Output - `portfolio_values`: time series of C_t. - `weights_over_time`: w_t per date.

[35]:
```
# Build monthly rebalanced allocations and portfolio values
optimizer = PortfolioOptimizer()
asset_ret_cols = [f"{a}_log_ret" for a in assets]

initial_capital = 1.0
portfolio_values = []
weights_over_time = []
current_capital = initial_capital
current_weights = np.ones(len(assets)) / len(assets)

for t, current_date in enumerate(dates):
    # Rebalance at month start
    is_month_start = (t == 0) or (dates[t - 1].month != current_date.month)
    if is_month_start:
        X_curr = X[t]  # shape: (n_assets, lookback, n_features)
        pred_mean, pred_log_var, _ = model(X_curr, training=False)
        predicted_returns = pred_mean.numpy().flatten()
        pred_vols = np.exp(0.5 * pred_log_var.numpy().flatten())

        date_loc = feature_df.index.get_loc(current_date)
        past_60_start = max(0, date_loc - 60)
        past_60_df = feature_df.iloc[past_60_start:date_loc]
        if len(past_60_df) >= 2:
            hist_corr = past_60_df[asset_ret_cols].corr().values
        else:
            hist_corr = np.eye(len(assets))

        sigma_hat = optimizer.convariance_matrix(pred_vols, hist_corr)
        current_weights = optimizer.optimize_portfolio(predicted_returns,␣
↪sigma_hat)
```

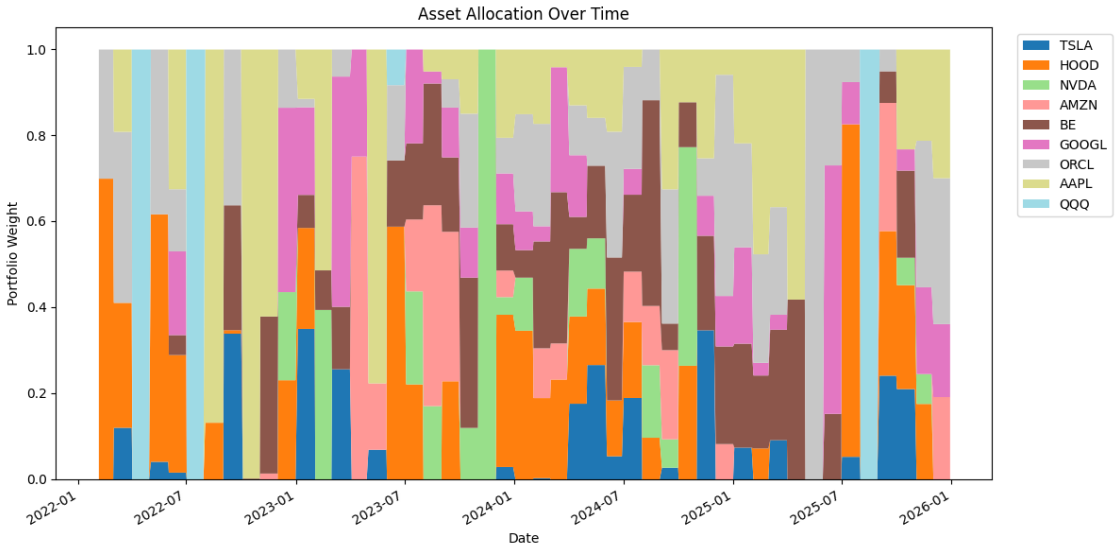
```
    # Apply daily log return
    actual_daily_returns = feature_df.loc[current_date, asset_ret_cols].values
    portfolio_ret = np.sum(current_weights * actual_daily_returns)
    current_capital *= np.exp(portfolio_ret)

    portfolio_values.append(current_capital)
    weights_over_time.append(current_weights)

weights_over_time = pd.DataFrame(weights_over_time, index=dates, columns=assets)
portfolio_values = pd.Series(portfolio_values, index=dates,␣
 ↪name="PortfolioValue")
```

1 Result visualization

[36]:
```
# Allocation over time
plt.figure(figsize=(12, 6))
weights_over_time.plot.area(stacked=True, linewidth=0, colormap="tab20", ax=plt.
 ↪gca())
plt.title("Asset Allocation Over Time")
plt.ylabel("Portfolio Weight")
plt.xlabel("Date")
plt.legend(loc="upper left", bbox_to_anchor=(1.02, 1), ncol=1)
plt.tight_layout()
plt.show()
```



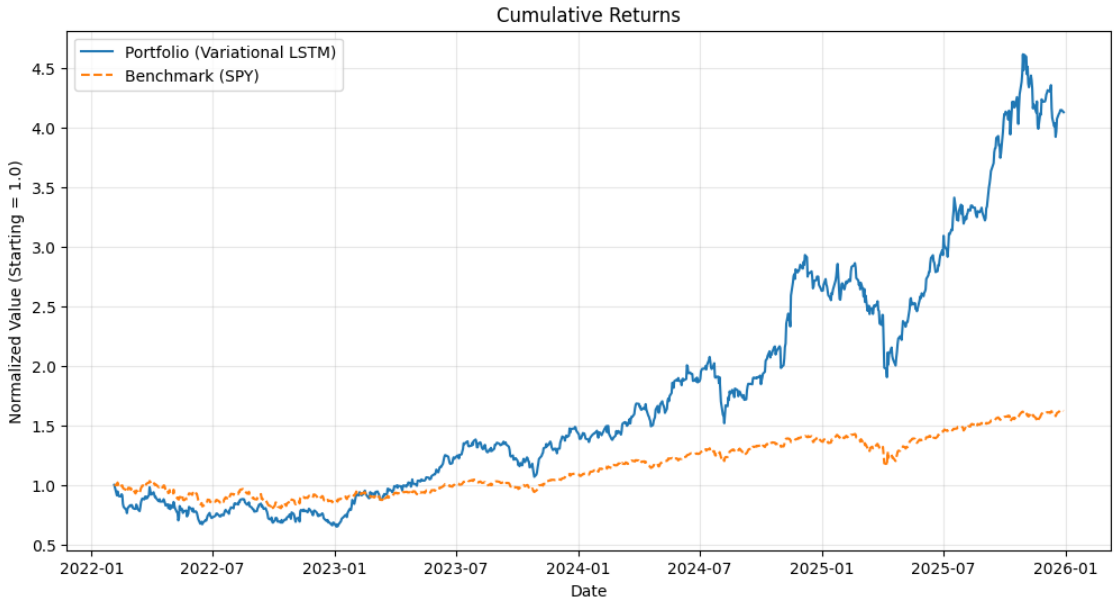
[37]:
```
# Cumulative returns vs SPY benchmark
spy_log_returns = feature_df.loc[dates, "SPY_log_ret"].values
benchmark_cum = np.exp(np.cumsum(spy_log_returns))
```

```
portfolio_cum = portfolio_values.values
portfolio_cum = portfolio_cum / portfolio_cum[0]
benchmark_cum = benchmark_cum / benchmark_cum[0]

print("Portfolio Cumulative Returns vs S&P500 outperform: ",␣
 ↪round(portfolio_cum[-1]/benchmark_cum[-1] *100, 2), "%")

plt.figure(figsize=(12, 6))
plt.plot(dates, portfolio_cum, label="Portfolio (Variational LSTM)")
plt.plot(dates, benchmark_cum, label="Benchmark (SPY)", linestyle="--")
plt.title("Cumulative Returns")
plt.ylabel("Normalized Value (Starting = 1.0)")
plt.xlabel("Date")
plt.legend()
plt.grid(True, alpha=0.3)
plt.show()
```

```
Portfolio Cumulative Returns vs S&P500 outperform:  254.85 %
```



[38]:
```
# Calculate daily returns for Sharpe Ratio (log returns, so differences are␣
 ↪fine)
portfolio_daily_returns = np.diff(np.log(portfolio_values.values))
spy_daily_returns = np.diff(np.log(benchmark_cum))

portfolio_sharpe = calc_sharpe(portfolio_daily_returns)
spy_sharpe = calc_sharpe(spy_daily_returns)
```

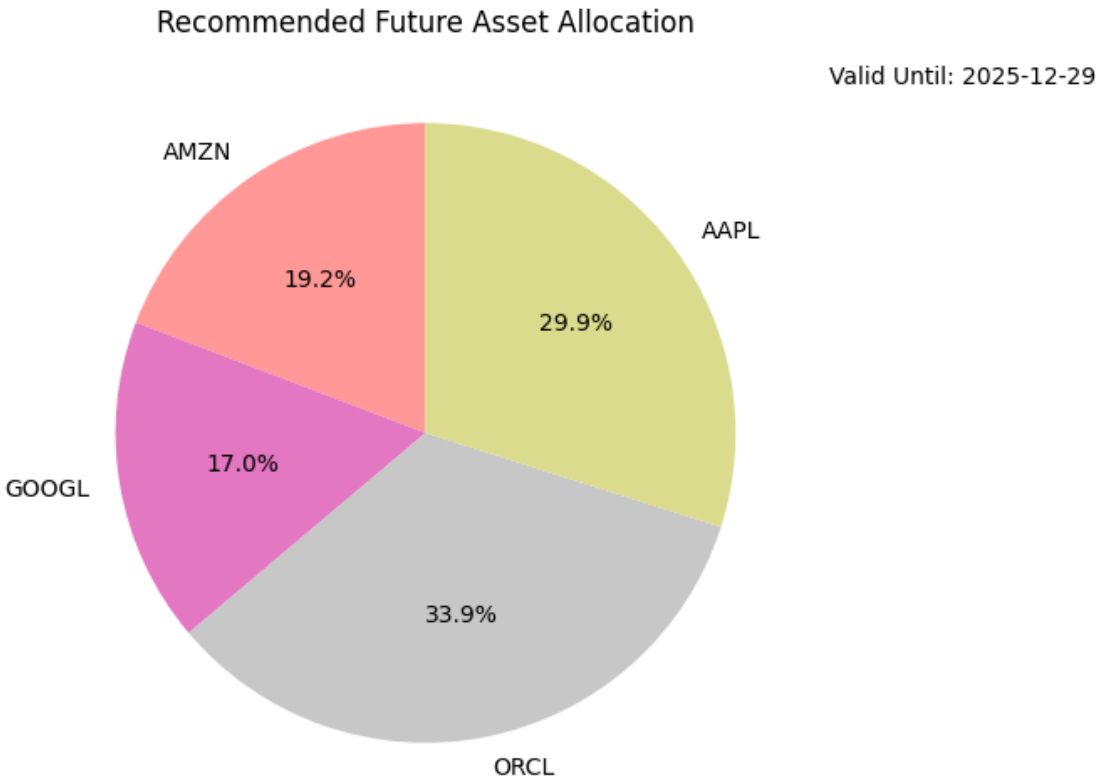
```
print(f"Sharpe Ratio (Portfolio): {portfolio_sharpe:.3f}")
print(f"Sharpe Ratio (S&P 500):   {spy_sharpe:.3f}")
```

```
Sharpe Ratio (Portfolio): 0.963
Sharpe Ratio (S&P 500):   0.694
```

[39]:
```
# Future allocation pie chart (last available date)
last_date = dates[-1]
last_alloc = weights_over_time.iloc[-1]
last_alloc = last_alloc[last_alloc > 0.001]

# Same ticker → same color as in the allocation-over-time area plot␣
↪(colormap="tab20")
asset_order = list(weights_over_time.columns)
tab20 = plt.get_cmap("tab20")
n_cols = len(asset_order)
norm = max(n_cols - 1, 1)
colors = [tab20(asset_order.index(a) / norm) for a in last_alloc.index]

plt.figure(figsize=(6, 6))
wedges, texts, autotexts = plt.pie(
    last_alloc.values,
    labels=last_alloc.index,
    autopct="%1.1f%%",
    startangle=90,
    colors=colors
)
plt.title("Recommended Future Asset Allocation")
plt.annotate(
    f"Valid Until: {last_date.date()}",
    xy=(1.02, 0.95),
    xycoords="axes fraction"
)
plt.show()
```


Recommended Future Asset Allocation
Valid Until: 2025-12-29
AMZN
19.2%
AAPL
29.9%
GOOGL
17.0%
ORCL
33.9%