FrankenBERT

August 30, 2025

```python
[5]: print("--- STEP 1: SETUP AND PREPARATION ---")

     # Connect to Google Drive - This should be the VERY FIRST step.
     from google.colab import drive
     drive.mount('/content/drive')
```

```
--- STEP 1: SETUP AND PREPARATION ---
Mounted at /content/drive
```

```python
[ ]: # Install libraries
     print("\n--- Installing required libraries ---")
     !pip install transformers datasets evaluate accelerate scikit-learn seaborn␣
      ↪matplotlib -q
```

```
--- Installing required libraries ---
                            84.1/84.1 kB
7.4 MB/s eta 0:00:00
```

```python
[ ]: import os
     import json
     import torch
     import shutil # For safely copying files like config.json
     import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     import torch.nn.functional as F
     from collections import OrderedDict
     from datasets import load_dataset
     from transformers import (
         AutoTokenizer,
         AutoModelForSequenceClassification,
         AutoModel,
         TrainingArguments,
         Trainer,
     )
     import evaluate
```

```python
# Define permanent paths in Google Drive
DRIVE_BASE_PATH = '/content/drive/MyDrive/CohereProject_FrankenBERT' # Renamed
 ↪for clarity
os.makedirs(DRIVE_BASE_PATH, exist_ok=True)

# Specific paths for models WITH classification heads (for final evaluation)
poet_final_save_path = os.path.join(DRIVE_BASE_PATH, 'poet_model_final')
scientist_final_save_path = os.path.join(DRIVE_BASE_PATH,
 ↪'scientist_model_final')
frankenbert_final_save_path = os.path.join(DRIVE_BASE_PATH,
 ↪'frankenbert_model_final')

# Specific paths for BASE models WITHOUT heads (for merging)
poet_base_save_path = os.path.join(DRIVE_BASE_PATH, 'poet_model_base')
scientist_base_save_path = os.path.join(DRIVE_BASE_PATH, 'scientist_model_base')

# Temporary path for heatmap models (can be in /content/ since they are
 ↪transient)
temp_merge_path = '/content/temp_merge_model'
```

```python
# --- Hugging Face Login ---
# This allows us to potentially download gated models or push our own.
# We'll use your Colab secret named 'HF_TOKEN'.
from google.colab import userdata

try:
    hf_token = userdata.get('HF_TOKEN')
    from huggingface_hub import login
    login(token=hf_token)
    print("Successfully logged into Hugging Face Hub.")
except:
    print("Hugging Face token not found or invalid. Proceeding without login.")
```

Successfully logged into Hugging Face Hub.

```python
# Check for GPU
if torch.cuda.is_available():
    print(f"GPU is available: {torch.cuda.get_device_name(0)}")
    device = torch.device("cuda")
else:
    print("GPU not available. Training will be very slow.")
    device = torch.device("cpu")
```

GPU is available: NVIDIA A100-SXM4-40GB

```python
# Universal tokenizer and metrics
model_checkpoint = "distilbert-base-uncased"
```

```
tokenizer = AutoTokenizer.from_pretrained(model_checkpoint)
accuracy_metric = evaluate.load("accuracy")
def compute_metrics(eval_pred):
    predictions, labels = eval_pred
    predictions = np.argmax(predictions, axis=1)
    return accuracy_metric.compute(predictions=predictions, references=labels)
```

```
tokenizer_config.json:    0%|          | 0.00/48.0 [00:00<?, ?B/s]

config.json:    0%|          | 0.00/483 [00:00<?, ?B/s]

vocab.txt:    0%|          | 0.00/232k [00:00<?, ?B/s]

tokenizer.json:    0%|          | 0.00/466k [00:00<?, ?B/s]

Downloading builder script: 0.00B [00:00, ?B/s]
```

1 TRAIN SPECIALIST MODELS

1.1 Train Model A - "The Poet" (Sentiment Expert)

```
[ ]: print("\n--- Preparing Poet (SST-2) ---")
poet_dataset = load_dataset("glue", "sst2")
def tokenize_poet(batch):
    return tokenizer(batch["sentence"], padding="max_length", truncation=True)
tokenized_poet_dataset = poet_dataset.map(tokenize_poet, batched=True)

poet_model = AutoModelForSequenceClassification.
 ↪from_pretrained(model_checkpoint, num_labels=2)
poet_training_args = TrainingArguments(output_dir="/content/
 ↪poet_training_output", eval_strategy="epoch", num_train_epochs=3)
poet_trainer = Trainer(model=poet_model, args=poet_training_args,␣
 ↪train_dataset=tokenized_poet_dataset["train"],␣
 ↪eval_dataset=tokenized_poet_dataset["validation"],␣
 ↪compute_metrics=compute_metrics)

print("--- Starting Poet training ---")
poet_trainer.train()
poet_trainer.save_model(poet_final_save_path)
print(f"--- Poet training complete. Final model saved to:␣
 ↪{poet_final_save_path} ---")
```

```
--- Preparing Poet (SST-2) ---

README.md: 0.00B [00:00, ?B/s]

sst2/train-00000-of-00001.parquet:    0%|          | 0.00/3.11M [00:00<?, ?B/s]

sst2/validation-00000-of-00001.parquet:    0%|          | 0.00/72.8k [00:00<?, ?B/
 ↪s]
```

```
sst2/test-00000-of-00001.parquet:    0%|          | 0.00/148k [00:00<?, ?B/s]

Generating train split:    0%|          | 0/67349 [00:00<?, ? examples/s]

Generating validation split:    0%|          | 0/872 [00:00<?, ? examples/s]

Generating test split:    0%|          | 0/1821 [00:00<?, ? examples/s]

Map:    0%|          | 0/67349 [00:00<?, ? examples/s]

Map:    0%|          | 0/872 [00:00<?, ? examples/s]

Map:    0%|          | 0/1821 [00:00<?, ? examples/s]

model.safetensors:    0%|          | 0.00/268M [00:00<?, ?B/s]
```

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at distilbert-base-uncased and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

--- Starting Poet training ---

/usr/local/lib/python3.12/dist-packages/notebook/notebookapp.py:191:
SyntaxWarning: invalid escape sequence '\/'
  | |_| | '_ \/ _` / _` | _/ -_)

<IPython.core.display.Javascript object>

wandb: Logging into wandb.ai. (Learn how to deploy a W&B server
locally: https://wandb.me/wandb-server)
wandb: You can find your API key in your browser here:
https://wandb.ai/authorize?ref=models
wandb: Paste an API key from your profile and hit enter:

 ....

wandb: WARNING If you're specifying your api key in code,
ensure this code is not shared publicly.
wandb: WARNING Consider setting the WANDB_API_KEY
environment variable, or running `wandb login` from the command line.
wandb: No netrc file found, creating one.
wandb: Appending key for api.wandb.ai to your netrc file:
/root/.netrc
wandb: Currently logged in as: vinodanbalagan
(vinodanbalagan-university-of-toronto) to
https://api.wandb.ai. Use `wandb login --relogin` to force
relogin

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

<IPython.core.display.HTML object>

```
<IPython.core.display.HTML object>

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<IPython.core.display.HTML object>

--- Poet training complete. Final model saved to:
/content/drive/MyDrive/CohereProject_FrankenBERT/poet_model_final ---
```

1.2   Train Model B - "The Scientist" (Factual Expert)

```python
print("\n--- Preparing Scientist (AG News) ---")
scientist_dataset = load_dataset("ag_news")
def tokenize_scientist(batch):
    return tokenizer(batch["text"], padding="max_length", truncation=True)
tokenized_scientist_dataset = scientist_dataset.map(tokenize_scientist,
  ↪batched=True).rename_column("label", "labels")

scientist_model = AutoModelForSequenceClassification.
  ↪from_pretrained(model_checkpoint, num_labels=4)
scientist_training_args = TrainingArguments(output_dir="/content/
  ↪scientist_training_output", eval_strategy="epoch", num_train_epochs=3)
scientist_trainer = Trainer(model=scientist_model,
  ↪args=scientist_training_args,
  ↪train_dataset=tokenized_scientist_dataset["train"],
  ↪eval_dataset=tokenized_scientist_dataset["test"],
  ↪compute_metrics=compute_metrics)
```

```
--- Preparing Scientist (AG News) ---

README.md: 0.00B [00:00, ?B/s]

train-00000-of-00001.parquet:   0%|          | 0.00/18.6M [00:00<?, ?B/s]

test-00000-of-00001.parquet:   0%|          | 0.00/1.23M [00:00<?, ?B/s]

Generating train split:   0%|          | 0/120000 [00:00<?, ? examples/s]

Generating test split:   0%|          | 0/7600 [00:00<?, ? examples/s]

Map:   0%|          | 0/120000 [00:00<?, ? examples/s]

Map:   0%|          | 0/7600 [00:00<?, ? examples/s]

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at distilbert-base-uncased and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.
```

```
[ ]: print("--- Starting Scientist training ---")
     scientist_trainer.train()
     scientist_trainer.save_model(scientist_final_save_path)
     print(f"--- Scientist training complete. Final model saved to:␣
       ↪{scientist_final_save_path} ---")
```

--- Starting Scientist training ---

<IPython.core.display.HTML object>

--- Scientist training complete. Final model saved to:
/content/drive/MyDrive/CohereProject_FrankenBERT/scientist_model_final ---

1.3 DECAPITATE AND MERGE MODELS

```
[ ]: print("\n\n--- STEP 3: DECAPITATE AND MERGE MODELS ---")

     # --- Decapitate and save BASE models to Google Drive ---
     print("--- Decapitating models (removing classification heads) ---")
     poet_base_model = AutoModel.from_pretrained(poet_final_save_path)
     poet_base_model.save_pretrained(poet_base_save_path)
     print(f"-> Poet base model saved to: {poet_base_save_path}")

     scientist_base_model = AutoModel.from_pretrained(scientist_final_save_path)
     scientist_base_model.save_pretrained(scientist_base_save_path)
     print(f"-> Scientist base model saved to: {scientist_base_save_path}")

     # --- Manual PyTorch Merge ---
     print("\n--- Performing manual merge with PyTorch ---")
     model_a = AutoModel.from_pretrained(poet_base_save_path)
     model_b = AutoModel.from_pretrained(scientist_base_save_path)
     params_a = model_a.state_dict()
     params_b = model_b.state_dict()
     merged_params = OrderedDict()

     print("Averaging tensors for 50/50 merge...")
     for key in params_a.keys():
         merged_params[key] = (params_a[key] + params_b[key]) / 2.0

     template_model = AutoModel.from_pretrained(model_checkpoint)
     template_model.load_state_dict(merged_params)
     template_model.save_pretrained(frankenbert_final_save_path)
     tokenizer.save_pretrained(frankenbert_final_save_path)
     print(f"--- MANUAL MERGE COMPLETE! FrankenBERT saved to:␣
       ↪{frankenbert_final_save_path} ---")
```

--- STEP 3: DECAPITATE AND MERGE MODELS ---

```
--- Decapitating models (removing classification heads) ---
-> Poet base model saved to:
/content/drive/MyDrive/CohereProject_FrankenBERT/poet_model_base
-> Scientist base model saved to:
/content/drive/MyDrive/CohereProject_FrankenBERT/scientist_model_base

--- Performing manual merge with PyTorch ---
Averaging tensors for 50/50 merge…
--- MANUAL MERGE COMPLETE! FrankenBERT saved to:
/content/drive/MyDrive/CohereProject_FrankenBERT/frankenbert_model_final ---
```

1.4 The Grand Evaluation

```python
print("\n\n--- STEP 4: EVALUATION ---")

def evaluate_model_on_task(model_path, dataset_name):
    print(f"\n--- Evaluating {os.path.basename(model_path)} on {dataset_name} ---")
    if dataset_name == "sst2":
        dataset = load_dataset("glue", "sst2", split="validation")
        tokenized_dataset = dataset.map(tokenize_poet, batched=True)
        num_labels = 2
    elif dataset_name == "ag_news":
        dataset = load_dataset("ag_news", split="test")
        tokenized_dataset = dataset.map(tokenize_scientist, batched=True).rename_column("label", "labels")
        num_labels = 4
    model = AutoModelForSequenceClassification.from_pretrained(model_path, num_labels=num_labels, ignore_mismatched_sizes=True)
    eval_args = TrainingArguments(output_dir="/content/eval_temp", per_device_eval_batch_size=64, report_to="none")
    eval_trainer = Trainer(model=model, args=eval_args, compute_metrics=compute_metrics)
    results = eval_trainer.evaluate(eval_dataset=tokenized_dataset)
    return results['eval_accuracy']

results = {}
models_to_test = {
    "poet_model": poet_final_save_path,
    "scientist_model": scientist_final_save_path,
    "frankenbert_model": frankenbert_final_save_path
}

for model_name, model_path in models_to_test.items():
    results[model_name] = {}
    for dataset_name in ["sst2", "ag_news"]:
        accuracy = evaluate_model_on_task(model_path, dataset_name)
```

```
        results[model_name][dataset_name] = accuracy
        print(f"-> Accuracy for {model_name} on {dataset_name}: {accuracy:.4f}")

results_df = pd.DataFrame(results).T
results_df.columns = ["Sentiment Accuracy (SST-2)", "News Accuracy (AG News)"]
print("\n\n--- FINAL RESULTS ---")
print(results_df)
```

--- STEP 4: EVALUATION ---

--- Evaluating poet_model_final on sst2 ---

<IPython.core.display.HTML object>

-> Accuracy for poet_model on sst2: 0.9025

--- Evaluating poet_model_final on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at
/content/drive/MyDrive/CohereProject_FrankenBERT/poet_model_final and are newly
initialized because the shapes did not match:
- classifier.bias: found shape torch.Size([2]) in the checkpoint and
torch.Size([4]) in the model instantiated
- classifier.weight: found shape torch.Size([2, 768]) in the checkpoint and
torch.Size([4, 768]) in the model instantiated
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

-> Accuracy for poet_model on ag_news: 0.3267

--- Evaluating scientist_model_final on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at
/content/drive/MyDrive/CohereProject_FrankenBERT/scientist_model_final and are
newly initialized because the shapes did not match:
- classifier.bias: found shape torch.Size([4]) in the checkpoint and
torch.Size([2]) in the model instantiated
- classifier.weight: found shape torch.Size([4, 768]) in the checkpoint and
torch.Size([2, 768]) in the model instantiated
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

-> Accuracy for scientist_model on sst2: 0.4931

```
--- Evaluating scientist_model_final on ag_news ---

<IPython.core.display.HTML object>

-> Accuracy for scientist_model on ag_news: 0.9457


--- Evaluating frankenbert_model_final on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at
/content/drive/MyDrive/CohereProject_FrankenBERT/frankenbert_model_final and are
newly initialized: ['classifier.bias', 'classifier.weight',
'pre_classifier.bias', 'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

-> Accuracy for frankenbert_model on sst2: 0.5356


--- Evaluating frankenbert_model_final on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at
/content/drive/MyDrive/CohereProject_FrankenBERT/frankenbert_model_final and are
newly initialized: ['classifier.bias', 'classifier.weight',
'pre_classifier.bias', 'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

-> Accuracy for frankenbert_model on ag_news: 0.1221



--- FINAL RESULTS ---
                     Sentiment Accuracy (SST-2)  News Accuracy (AG News)
poet_model                        0.902523                 0.326711
scientist_model                   0.493119                 0.945658
frankenbert_model                 0.535550                 0.122105
```

1.5 Visualizations

```python
print("\n\n--- STEP 5: VISUALIZATION AND EVIDENCE ---")
import seaborn as sns

# --- Load final models for live prediction ---
print("\n--- Loading final models into memory for live predictions ---")
# Make sure to move models to the GPU if you have one
```

```python
poet_model = AutoModelForSequenceClassification.
 ↪from_pretrained(poet_final_save_path).to(device)
scientist_model = AutoModelForSequenceClassification.
 ↪from_pretrained(scientist_final_save_path).to(device)
frankenbert_model = AutoModelForSequenceClassification.
 ↪from_pretrained(frankenbert_final_save_path).to(device)


# --- The Grouped Bar Chart ---
print("\n--- Generating Bar Chart ---")
results_for_plot = results_df.reset_index().melt(id_vars='index',
 ↪var_name='Task', value_name='Accuracy')
results_for_plot.rename(columns={'index': 'Model'}, inplace=True)
plt.figure(figsize=(12, 8))
ax = sns.barplot(data=results_for_plot, x='Task', y='Accuracy', hue='Model',
 ↪palette='viridis')
for p in ax.patches:
    ax.annotate(f"{p.get_height():.2f}", (p.get_x() + p.get_width() / 2., p.
 ↪get_height()), ha='center', va='center', xytext=(0, 9), textcoords='offset
 ↪points')
plt.title('Specialist Performance vs. Merged Model Interference', fontsize=18)
plt.ylabel('Validation Accuracy', fontsize=12)
plt.xlabel('Evaluation Task', fontsize=12)
plt.ylim(0, 1.0)
plt.legend(title='Model', fontsize=11)
plt.tight_layout()
plt.show()

# --- The Interference Heatmap ---
print("\n--- Generating Heatmap ---")
heatmap_data = []
merge_ratios = [0.0, 0.25, 0.5, 0.75, 1.0]
for ratio in merge_ratios:
    print(f"--- Evaluating merge ratio: {ratio} ---")
    merged_params = OrderedDict()
    for key in params_a.keys():
        merged_params[key] = (params_a[key] * ratio) + (params_b[key] * (1.0 -
 ↪ratio))
    template_model.load_state_dict(merged_params)
    template_model.save_pretrained(temp_merge_path)
    tokenizer.save_pretrained(temp_merge_path)
    acc_sst2 = evaluate_model_on_task(temp_merge_path, "sst2")
    acc_ag_news = evaluate_model_on_task(temp_merge_path, "ag_news")
    heatmap_data.append({"Poet Ratio": ratio, "Sentiment Accuracy (SST-2)":
 ↪acc_sst2, "News Accuracy (AG News)": acc_ag_news})
```
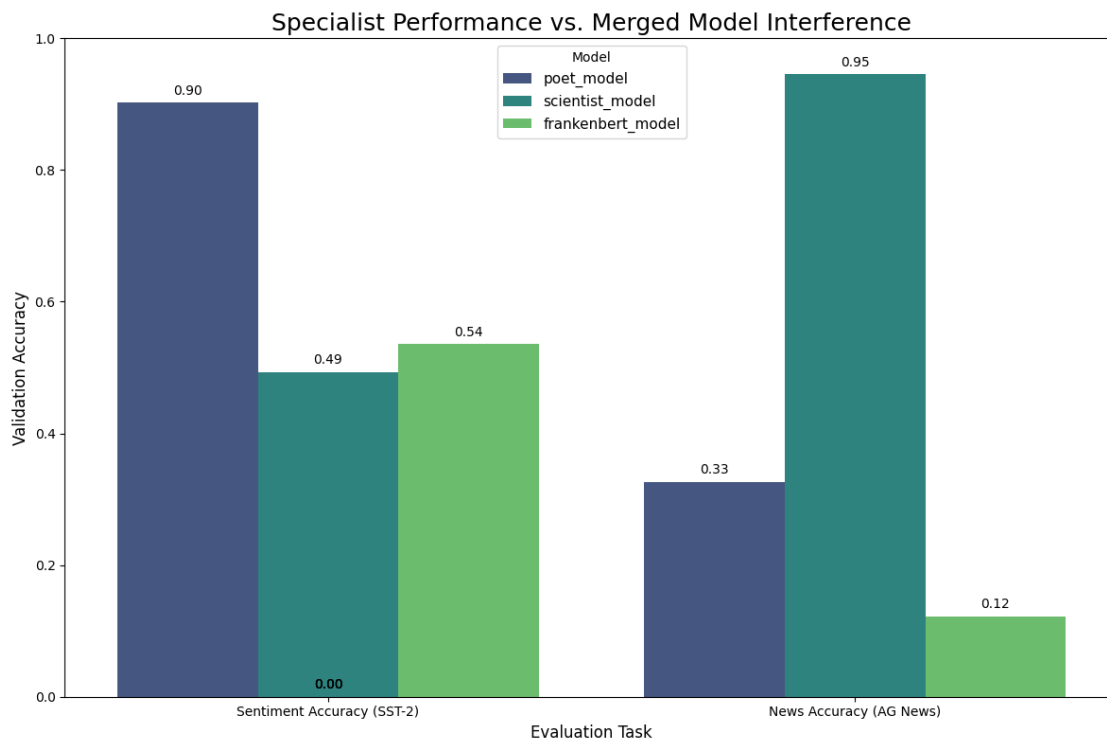
```
heatmap_df = pd.DataFrame(heatmap_data).set_index("Poet Ratio")
plt.figure(figsize=(10, 6))
sns.heatmap(heatmap_df.T, annot=True, fmt=".3f", cmap="viridis", linewidths=.5)
plt.title('Performance Heatmap of Model Merging', fontsize=18)
plt.ylabel('Evaluation Task', fontsize=12)
plt.xlabel('Merge Ratio (1.0 = 100% Poet)', fontsize=12)
plt.show()
print("\n--- Heatmap Results ---")
print(heatmap_df)
```

--- STEP 5: VISUALIZATION AND EVIDENCE ---

--- Loading final models into memory for live predictions ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at
/content/drive/MyDrive/CohereProject_FrankenBERT/frankenbert_model_final and are
newly initialized: ['classifier.bias', 'classifier.weight',
'pre_classifier.bias', 'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

--- Generating Bar Chart ---

Specialist Performance vs. Merged Model Interference

```
--- Generating Heatmap ---
--- Evaluating merge ratio: 0.0 ---

--- Evaluating temp_merge_model on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>


--- Evaluating temp_merge_model on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

--- Evaluating merge ratio: 0.25 ---

--- Evaluating temp_merge_model on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>


--- Evaluating temp_merge_model on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>
```

```
--- Evaluating merge ratio: 0.5 ---

--- Evaluating temp_merge_model on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>


--- Evaluating temp_merge_model on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

--- Evaluating merge ratio: 0.75 ---

--- Evaluating temp_merge_model on sst2 ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>


--- Evaluating temp_merge_model on ag_news ---

Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.

<IPython.core.display.HTML object>

--- Evaluating merge ratio: 1.0 ---

--- Evaluating temp_merge_model on sst2 ---
```

```
Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.
```

`<IPython.core.display.HTML object>`
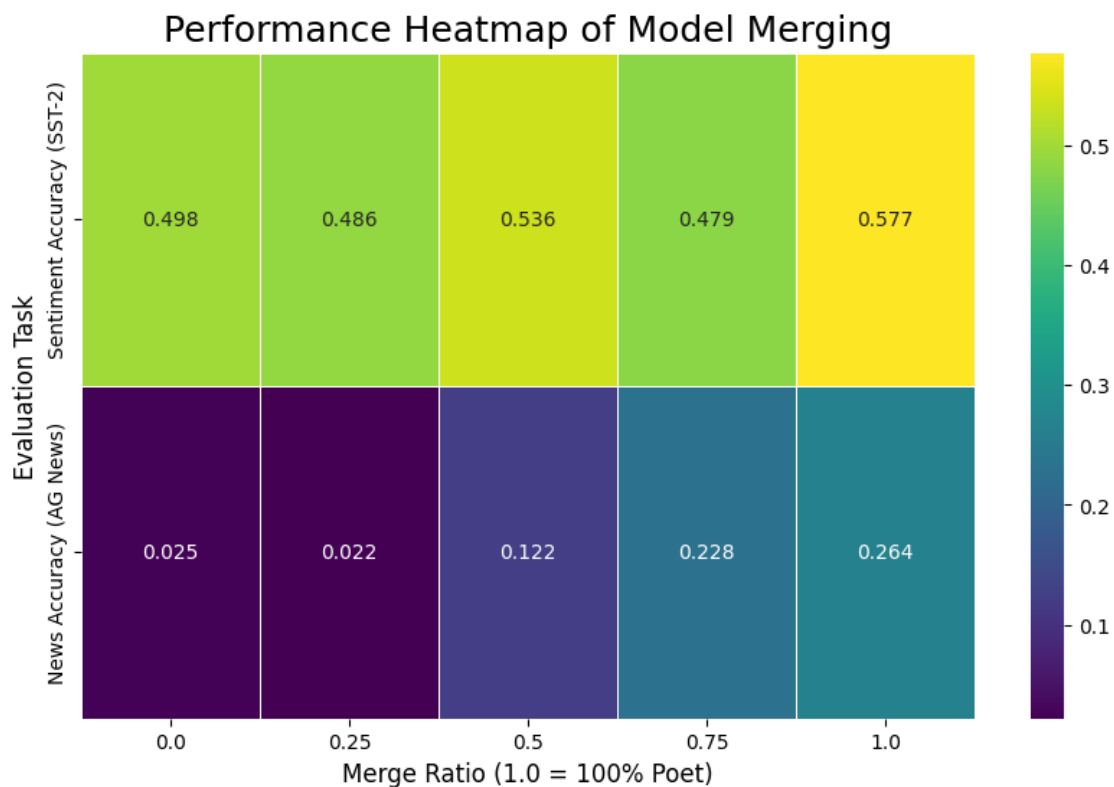
```
--- Evaluating temp_merge_model on ag_news ---
```

```
Some weights of DistilBertForSequenceClassification were not initialized from
the model checkpoint at /content/temp_merge_model and are newly initialized:
['classifier.bias', 'classifier.weight', 'pre_classifier.bias',
'pre_classifier.weight']
You should probably TRAIN this model on a down-stream task to be able to use it
for predictions and inference.
```

`<IPython.core.display.HTML object>`


```
--- Heatmap Results ---
          Sentiment Accuracy (SST-2)  News Accuracy (AG News)
```

```
Poet Ratio
0.00                    0.497706                    0.025000
0.25                    0.486239                    0.021842
0.50                    0.535550                    0.122105
0.75                    0.479358                    0.228289
1.00                    0.576835                    0.264079
```

1.6 Prediction Evidence

```python
print("\n\n--- FINAL EVIDENCE: LIVE PREDICTIONS ---")
def get_prediction(model, tokenizer, text, label_map):
    model.eval()
    inputs = tokenizer(text, return_tensors="pt", padding=True, truncation=True)
    inputs = {k: v.to(model.device) for k, v in inputs.items()}
    with torch.no_grad():
        logits = model(**inputs).logits
    probabilities = F.softmax(logits, dim=1)
    confidence, predicted_class_idx = torch.max(probabilities, dim=1)
    predicted_label = label_map[predicted_class_idx.item()]
    confidence_score = confidence.item()
    return predicted_label, confidence_score

sst2_label_map = {0: 'NEGATIVE', 1: 'POSITIVE'}
ag_news_label_map = {0: 'World', 1: 'Sports', 2: 'Business', 3: 'Sci/Tech'}
sentiment_sentence = "The film was a masterpiece of emotional storytelling."
news_sentence = "The central bank announced a new policy to curb inflation."

print("="*50)
print(f"TASK 1: SENTIMENT ANALYSIS\nInput: '{sentiment_sentence}'")
print("="*50)
label, score = get_prediction(poet_model, tokenizer, sentiment_sentence,
 ↪sst2_label_map)
print(f"Poet Model Prediction:     {label} (Confidence: {score:.2%})")
label, score = get_prediction(scientist_model, tokenizer, sentiment_sentence,
 ↪sst2_label_map)
print(f"Scientist Model Prediction:  {label} (Confidence: {score:.2%})")
label, score = get_prediction(frankenbert_model, tokenizer, sentiment_sentence,
 ↪sst2_label_map)
print(f"FrankenBERT Model Prediction: {label} (Confidence: {score:.2%})")

print("\n" + "="*50)
print(f"TASK 2: NEWS CLASSIFICATION\nInput: '{news_sentence}'")
print("="*50)
label, score = get_prediction(poet_model, tokenizer, news_sentence,
 ↪ag_news_label_map)
print(f"Poet Model Prediction:     {label} (Confidence: {score:.2%})")
```

```python
label, score = get_prediction(scientist_model, tokenizer, news_sentence,␣
 ↪ag_news_label_map)
print(f"Scientist Model Prediction:  {label} (Confidence: {score:.2%})")
label, score = get_prediction(frankenbert_model, tokenizer, news_sentence,␣
 ↪ag_news_label_map)
print(f"FrankenBERT Model Prediction: {label} (Confidence: {score:.2%})")
```

```
--- FINAL EVIDENCE: LIVE PREDICTIONS ---
=================================================
TASK 1: SENTIMENT ANALYSIS
Input: 'The film was a masterpiece of emotional storytelling.'
=================================================
Poet Model Prediction:     POSITIVE (Confidence: 99.99%)
Scientist Model Prediction:  NEGATIVE (Confidence: 99.58%)
FrankenBERT Model Prediction: NEGATIVE (Confidence: 55.57%)


=================================================
TASK 2: NEWS CLASSIFICATION
Input: 'The central bank announced a new policy to curb inflation.'
=================================================
Poet Model Prediction:     Sports (Confidence: 93.97%)
Scientist Model Prediction:  Business (Confidence: 98.25%)
FrankenBERT Model Prediction: World (Confidence: 52.59%)
```

[1]:
```
!sudo apt-get update
!sudo apt-get install texlive-xetex pandoc
```

```
 0% [Working]                Hit:1 http://archive.ubuntu.com/ubuntu jammy
InRelease
 0% [Waiting for headers] [Connecting to security.ubuntu.com (185.125.190.83)] [
Hit:2 https://cli.github.com/packages stable InRelease
 0% [Waiting for headers] [Connecting to security.ubuntu.com (185.125.190.83)] [
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
 0% [3 InRelease 12.7 kB/128 kB 10%] [Connecting to security.ubuntu.com (185.125
Get:4 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64
InRelease [1,581 B]
 0% [3 InRelease 27.2 kB/128 kB 21%] [Waiting for headers] [Waiting for headers]
0% [3 InRelease 28.7 kB/128 kB 22%] [Waiting for headers] [Waiting for headers]
Get:5 https://cloud.r-project.org/bin/linux/ubuntu jammy-cran40/ InRelease
[3,632 B]
 0% [3 InRelease 63.4 kB/128 kB 50%] [Waiting for headers] [5 InRelease 3,632 B/
0% [3 InRelease 63.4 kB/128 kB 50%] [Waiting for headers] [Waiting for headers]
Get:6 https://r2u.stat.illinois.edu/ubuntu jammy InRelease [6,555 B]
Get:7 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
```

```
Get:9 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64
Packages [1,942 kB]
Get:10 https://r2u.stat.illinois.edu/ubuntu jammy/main all Packages [9,202 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages
[5,543 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [3,617
kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages
[1,576 kB]
Get:14 https://r2u.stat.illinois.edu/ubuntu jammy/main amd64 Packages [2,782 kB]
Get:15 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages
[3,297 kB]
Hit:16 https://ppa.launchpadcontent.net/deadsnakes/ppa/ubuntu jammy InRelease
Hit:17 https://ppa.launchpadcontent.net/graphics-drivers/ppa/ubuntu jammy
InRelease
Hit:18 https://ppa.launchpadcontent.net/ubuntugis/ppa/ubuntu jammy InRelease
Get:19 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64
Packages [5,340 kB]
Get:20 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages
[1,272 kB]
Fetched 35.0 MB in 2s (17.3 MB/s)
Reading package lists… Done
W: Skipping acquire of configured file 'main/source/Sources' as repository
'https://r2u.stat.illinois.edu/ubuntu jammy InRelease' does not seem to provide
it (sources.list entry misspelt?)
Reading package lists… Done
Building dependency tree… Done
Reading state information… Done
The following additional packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java
  libcmark-gfm-extensions0.29.0.gfm.3 libcmark-gfm0.29.0.gfm.3
  libcommons-logging-java libcommons-parent-java libfontbox-java libgs9
  libgs9-common libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java
  libptexenc1 libruby3.0 libsynctex2 libteckit0 libtexlua53 libtexluajit2
  libwoff1 libzzip-0-13 lmodern pandoc-data poppler-data preview-latex-style
  rake ruby ruby-net-telnet ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0
  rubygems-integration t1utils teckit tex-common tex-gyre texlive-base
  texlive-binaries texlive-fonts-recommended texlive-latex-base
  texlive-latex-extra texlive-latex-recommended texlive-pictures
  texlive-plain-generic tipa xfonts-encodings xfonts-utils
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf libavalon-framework-java
  libcommons-logging-java-doc libexcalibur-logkit-java liblog4j1.2-java
  texlive-luatex pandoc-citeproc context wkhtmltopdf librsvg2-bin groff ghc
  nodejs php python libjs-mathjax libjs-katex citation-style-language-styles
  poppler-utils ghostscript fonts-japanese-mincho | fonts-ipafont-mincho
  fonts-japanese-gothic | fonts-ipafont-gothic fonts-arphic-ukai
```

```
    fonts-arphic-uming fonts-nanum ri ruby-dev bundler debhelper gv
    | postscript-viewer perl-tk xpdf | pdf-viewer xzdec
    texlive-fonts-recommended-doc texlive-latex-base-doc python3-pygments
    icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl
    texlive-latex-extra-doc texlive-latex-recommended-doc texlive-pstricks
    dot2tex prerex texlive-pictures-doc vprerex default-jre-headless tipa-doc
The following NEW packages will be installed:
    dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
    fonts-texgyre fonts-urw-base35 libapache-pom-java
    libcmark-gfm-extensions0.29.0.gfm.3 libcmark-gfm0.29.0.gfm.3
    libcommons-logging-java libcommons-parent-java libfontbox-java libgs9
    libgs9-common libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java
    libptexenc1 libruby3.0 libsynctex2 libteckit0 libtexlua53 libtexluajit2
    libwoff1 libzzip-0-13 lmodern pandoc pandoc-data poppler-data
    preview-latex-style rake ruby ruby-net-telnet ruby-rubygems ruby-webrick
    ruby-xmlrpc ruby3.0 rubygems-integration t1utils teckit tex-common tex-gyre
    texlive-base texlive-binaries texlive-fonts-recommended texlive-latex-base
    texlive-latex-extra texlive-latex-recommended texlive-pictures
    texlive-plain-generic texlive-xetex tipa xfonts-encodings xfonts-utils
0 upgraded, 57 newly installed, 0 to remove and 39 not upgraded.
Need to get 202 MB of archives.
After this operation, 728 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-droid-fallback all
1:6.0.1r16-1.1build1 [1,805 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-lato all 2.0-2.1
[2,696 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 poppler-data all
0.4.11-1 [2,171 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-common all 6.17
[33.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-urw-base35 all
20200910-1 [6,367 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9-common
all 9.55.0~dfsg1-0ubuntu5.12 [753 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libidn12 amd64
1.38-4ubuntu1 [60.0 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 libijs-0.35 amd64
0.35-15build2 [16.5 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/main amd64 libjbig2dec0 amd64
0.19-3build2 [64.7 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9 amd64
9.55.0~dfsg1-0ubuntu5.12 [5,031 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libkpathsea6
amd64 2021.20210626.59705-1ubuntu0.2 [60.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 libwoff1 amd64
1.0.2-1build4 [45.2 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy/universe amd64 dvisvgm amd64
2.13.1-1 [1,221 kB]
```

```
Get:14 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-lmodern all
2.004.5-6.1 [4,532 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-noto-mono all
20201225-1build1 [397 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-texgyre all
20180621-3.1 [10.2 MB]
Get:17 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libapache-pom-java
all 18-1 [4,720 B]
Get:18 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcmark-
gfm0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [115 kB]
Get:19 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcmark-gfm-
extensions0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [25.1 kB]
Get:20 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-parent-
java all 43-1 [10.8 kB]
Get:21 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-logging-
java all 1.2-2 [60.3 kB]
Get:22 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libptexenc1
amd64 2021.20210626.59705-1ubuntu0.2 [39.1 kB]
Get:23 http://archive.ubuntu.com/ubuntu jammy/main amd64 rubygems-integration
all 1.18 [5,336 B]
Get:24 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby3.0 amd64
3.0.2-7ubuntu2.10 [50.1 kB]
Get:25 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby-rubygems all
3.3.5-2 [228 kB]
Get:26 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby amd64 1:3.0~exp1
[5,100 B]
Get:27 http://archive.ubuntu.com/ubuntu jammy/main amd64 rake all 13.0.6-2 [61.7
kB]
Get:28 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby-net-telnet all
0.1.1-2 [12.6 kB]
Get:29 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-webrick
all 1.7.0-3ubuntu0.2 [52.5 kB]
Get:30 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-xmlrpc all
0.3.2-1ubuntu0.1 [24.9 kB]
Get:31 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libruby3.0
amd64 3.0.2-7ubuntu2.10 [5,114 kB]
Get:32 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libsynctex2
amd64 2021.20210626.59705-1ubuntu0.2 [55.6 kB]
Get:33 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libteckit0 amd64
2.5.11+ds1-1 [421 kB]
Get:34 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexlua53
amd64 2021.20210626.59705-1ubuntu0.2 [120 kB]
Get:35 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexluajit2
amd64 2021.20210626.59705-1ubuntu0.2 [267 kB]
Get:36 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libzzip-0-13 amd64
0.13.72+dfsg.1-1.1 [27.0 kB]
Get:37 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-encodings all
1:1.0.5-0ubuntu2 [578 kB]
```

```
Get:38 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-utils amd64
1:7.7+6build2 [94.6 kB]
Get:39 http://archive.ubuntu.com/ubuntu jammy/universe amd64 lmodern all
2.004.5-6.1 [9,471 kB]
Get:40 http://archive.ubuntu.com/ubuntu jammy/universe amd64 pandoc-data all
2.9.2.1-3ubuntu2 [81.8 kB]
Get:41 http://archive.ubuntu.com/ubuntu jammy/universe amd64 pandoc amd64
2.9.2.1-3ubuntu2 [20.3 MB]
Get:42 http://archive.ubuntu.com/ubuntu jammy/universe amd64 preview-latex-style
all 12.2-1ubuntu1 [185 kB]
Get:43 http://archive.ubuntu.com/ubuntu jammy/main amd64 t1utils amd64
1.41-4build2 [61.3 kB]
Get:44 http://archive.ubuntu.com/ubuntu jammy/universe amd64 teckit amd64
2.5.11+ds1-1 [699 kB]
Get:45 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-gyre all
20180621-3.1 [6,209 kB]
Get:46 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 texlive-
binaries amd64 2021.20210626.59705-1ubuntu0.2 [9,860 kB]
Get:47 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-base all
2021.20220204-1 [21.0 MB]
Get:48 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-fonts-
recommended all 2021.20220204-1 [4,972 kB]
Get:49 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-base
all 2021.20220204-1 [1,128 kB]
Get:50 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libfontbox-java all
1:1.8.16-2 [207 kB]
Get:51 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libpdfbox-java all
1:1.8.16-2 [5,199 kB]
Get:52 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-
recommended all 2021.20220204-1 [14.4 MB]
Get:53 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-pictures
all 2021.20220204-1 [8,720 kB]
Get:54 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-extra
all 2021.20220204-1 [13.9 MB]
Get:55 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-plain-
generic all 2021.20220204-1 [27.5 MB]
Get:56 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tipa all 2:1.3-21
[2,967 kB]
Get:57 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-xetex all
2021.20220204-1 [12.4 MB]
Fetched 202 MB in 2s (103 MB/s)
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line 78,
<> line 57.)
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (This frontend requires a controlling tty.)
```

```
debconf: falling back to frontend: Teletype
dpkg-preconfigure: unable to re-open stdin:
Selecting previously unselected package fonts-droid-fallback.
(Reading database … 126371 files and directories currently installed.)
Preparing to unpack …/00-fonts-droid-fallback_1%3a6.0.1r16-1.1build1_all.deb
…
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Selecting previously unselected package fonts-lato.
Preparing to unpack …/01-fonts-lato_2.0-2.1_all.deb …
Unpacking fonts-lato (2.0-2.1) …
Selecting previously unselected package poppler-data.
Preparing to unpack …/02-poppler-data_0.4.11-1_all.deb …
Unpacking poppler-data (0.4.11-1) …
Selecting previously unselected package tex-common.
Preparing to unpack …/03-tex-common_6.17_all.deb …
Unpacking tex-common (6.17) …
Selecting previously unselected package fonts-urw-base35.
Preparing to unpack …/04-fonts-urw-base35_20200910-1_all.deb …
Unpacking fonts-urw-base35 (20200910-1) …
Selecting previously unselected package libgs9-common.
Preparing to unpack …/05-libgs9-common_9.55.0~dfsg1-0ubuntu5.12_all.deb …
Unpacking libgs9-common (9.55.0~dfsg1-0ubuntu5.12) …
Selecting previously unselected package libidn12:amd64.
Preparing to unpack …/06-libidn12_1.38-4ubuntu1_amd64.deb …
Unpacking libidn12:amd64 (1.38-4ubuntu1) …
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack …/07-libijs-0.35_0.35-15build2_amd64.deb …
Unpacking libijs-0.35:amd64 (0.35-15build2) …
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack …/08-libjbig2dec0_0.19-3build2_amd64.deb …
Unpacking libjbig2dec0:amd64 (0.19-3build2) …
Selecting previously unselected package libgs9:amd64.
Preparing to unpack …/09-libgs9_9.55.0~dfsg1-0ubuntu5.12_amd64.deb …
Unpacking libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.12) …
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack …/10-libkpathsea6_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack …/11-libwoff1_1.0.2-1build4_amd64.deb …
Unpacking libwoff1:amd64 (1.0.2-1build4) …
Selecting previously unselected package dvisvgm.
Preparing to unpack …/12-dvisvgm_2.13.1-1_amd64.deb …
Unpacking dvisvgm (2.13.1-1) …
Selecting previously unselected package fonts-lmodern.
Preparing to unpack …/13-fonts-lmodern_2.004.5-6.1_all.deb …
Unpacking fonts-lmodern (2.004.5-6.1) …
Selecting previously unselected package fonts-noto-mono.
```

```
Preparing to unpack …/14-fonts-noto-mono_20201225-1build1_all.deb …
Unpacking fonts-noto-mono (20201225-1build1) …
Selecting previously unselected package fonts-texgyre.
Preparing to unpack …/15-fonts-texgyre_20180621-3.1_all.deb …
Unpacking fonts-texgyre (20180621-3.1) …
Selecting previously unselected package libapache-pom-java.
Preparing to unpack …/16-libapache-pom-java_18-1_all.deb …
Unpacking libapache-pom-java (18-1) …
Selecting previously unselected package libcmark-gfm0.29.0.gfm.3:amd64.
Preparing to unpack …/17-libcmark-gfm0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb …
Unpacking libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Selecting previously unselected package libcmark-gfm-
extensions0.29.0.gfm.3:amd64.
Preparing to unpack …/18-libcmark-gfm-
extensions0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb …
Unpacking libcmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack …/19-libcommons-parent-java_43-1_all.deb …
Unpacking libcommons-parent-java (43-1) …
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack …/20-libcommons-logging-java_1.2-2_all.deb …
Unpacking libcommons-logging-java (1.2-2) …
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack …/21-libptexenc1_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package rubygems-integration.
Preparing to unpack …/22-rubygems-integration_1.18_all.deb …
Unpacking rubygems-integration (1.18) …
Selecting previously unselected package ruby3.0.
Preparing to unpack …/23-ruby3.0_3.0.2-7ubuntu2.10_amd64.deb …
Unpacking ruby3.0 (3.0.2-7ubuntu2.10) …
Selecting previously unselected package ruby-rubygems.
Preparing to unpack …/24-ruby-rubygems_3.3.5-2_all.deb …
Unpacking ruby-rubygems (3.3.5-2) …
Selecting previously unselected package ruby.
Preparing to unpack …/25-ruby_1%3a3.0~exp1_amd64.deb …
Unpacking ruby (1:3.0~exp1) …
Selecting previously unselected package rake.
Preparing to unpack …/26-rake_13.0.6-2_all.deb …
Unpacking rake (13.0.6-2) …
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack …/27-ruby-net-telnet_0.1.1-2_all.deb …
Unpacking ruby-net-telnet (0.1.1-2) …
Selecting previously unselected package ruby-webrick.
Preparing to unpack …/28-ruby-webrick_1.7.0-3ubuntu0.2_all.deb …
Unpacking ruby-webrick (1.7.0-3ubuntu0.2) …
Selecting previously unselected package ruby-xmlrpc.
```

```
Preparing to unpack …/29-ruby-xmlrpc_0.3.2-1ubuntu0.1_all.deb …
Unpacking ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Selecting previously unselected package libruby3.0:amd64.
Preparing to unpack …/30-libruby3.0_3.0.2-7ubuntu2.10_amd64.deb …
Unpacking libruby3.0:amd64 (3.0.2-7ubuntu2.10) …
Selecting previously unselected package libsynctex2:amd64.
Preparing to unpack …/31-libsynctex2_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libteckit0:amd64.
Preparing to unpack …/32-libteckit0_2.5.11+ds1-1_amd64.deb …
Unpacking libteckit0:amd64 (2.5.11+ds1-1) …
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack …/33-libtexlua53_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack
…/34-libtexluajit2_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libzzip-0-13:amd64.
Preparing to unpack …/35-libzzip-0-13_0.13.72+dfsg.1-1.1_amd64.deb …
Unpacking libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
Selecting previously unselected package xfonts-encodings.
Preparing to unpack …/36-xfonts-encodings_1%3a1.0.5-0ubuntu2_all.deb …
Unpacking xfonts-encodings (1:1.0.5-0ubuntu2) …
Selecting previously unselected package xfonts-utils.
Preparing to unpack …/37-xfonts-utils_1%3a7.7+6build2_amd64.deb …
Unpacking xfonts-utils (1:7.7+6build2) …
Selecting previously unselected package lmodern.
Preparing to unpack …/38-lmodern_2.004.5-6.1_all.deb …
Unpacking lmodern (2.004.5-6.1) …
Selecting previously unselected package pandoc-data.
Preparing to unpack …/39-pandoc-data_2.9.2.1-3ubuntu2_all.deb …
Unpacking pandoc-data (2.9.2.1-3ubuntu2) …
Selecting previously unselected package pandoc.
Preparing to unpack …/40-pandoc_2.9.2.1-3ubuntu2_amd64.deb …
Unpacking pandoc (2.9.2.1-3ubuntu2) …
Selecting previously unselected package preview-latex-style.
Preparing to unpack …/41-preview-latex-style_12.2-1ubuntu1_all.deb …
Unpacking preview-latex-style (12.2-1ubuntu1) …
Selecting previously unselected package t1utils.
Preparing to unpack …/42-t1utils_1.41-4build2_amd64.deb …
Unpacking t1utils (1.41-4build2) …
Selecting previously unselected package teckit.
Preparing to unpack …/43-teckit_2.5.11+ds1-1_amd64.deb …
Unpacking teckit (2.5.11+ds1-1) …
Selecting previously unselected package tex-gyre.
```

```
Preparing to unpack …/44-tex-gyre_20180621-3.1_all.deb …
Unpacking tex-gyre (20180621-3.1) …
Selecting previously unselected package texlive-binaries.
Preparing to unpack …/45-texlive-
binaries_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package texlive-base.
Preparing to unpack …/46-texlive-base_2021.20220204-1_all.deb …
Unpacking texlive-base (2021.20220204-1) …
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack …/47-texlive-fonts-recommended_2021.20220204-1_all.deb …
Unpacking texlive-fonts-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-latex-base.
Preparing to unpack …/48-texlive-latex-base_2021.20220204-1_all.deb …
Unpacking texlive-latex-base (2021.20220204-1) …
Selecting previously unselected package libfontbox-java.
Preparing to unpack …/49-libfontbox-java_1%3a1.8.16-2_all.deb …
Unpacking libfontbox-java (1:1.8.16-2) …
Selecting previously unselected package libpdfbox-java.
Preparing to unpack …/50-libpdfbox-java_1%3a1.8.16-2_all.deb …
Unpacking libpdfbox-java (1:1.8.16-2) …
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack …/51-texlive-latex-recommended_2021.20220204-1_all.deb …
Unpacking texlive-latex-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-pictures.
Preparing to unpack …/52-texlive-pictures_2021.20220204-1_all.deb …
Unpacking texlive-pictures (2021.20220204-1) …
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack …/53-texlive-latex-extra_2021.20220204-1_all.deb …
Unpacking texlive-latex-extra (2021.20220204-1) …
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack …/54-texlive-plain-generic_2021.20220204-1_all.deb …
Unpacking texlive-plain-generic (2021.20220204-1) …
Selecting previously unselected package tipa.
Preparing to unpack …/55-tipa_2%3a1.3-21_all.deb …
Unpacking tipa (2:1.3-21) …
Selecting previously unselected package texlive-xetex.
Preparing to unpack …/56-texlive-xetex_2021.20220204-1_all.deb …
Unpacking texlive-xetex (2021.20220204-1) …
Setting up fonts-lato (2.0-2.1) …
Setting up fonts-noto-mono (20201225-1build1) …
Setting up libwoff1:amd64 (1.0.2-1build4) …
Setting up libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libijs-0.35:amd64 (0.35-15build2) …
Setting up libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libfontbox-java (1:1.8.16-2) …
Setting up rubygems-integration (1.18) …
Setting up libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
```

```
Setting up fonts-urw-base35 (20200910-1) …
Setting up poppler-data (0.4.11-1) …
Setting up tex-common (6.17) …
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
update-language: texlive-base not installed and configured, doing nothing!
Setting up libjbig2dec0:amd64 (0.19-3build2) …
Setting up libteckit0:amd64 (2.5.11+ds1-1) …
Setting up libapache-pom-java (18-1) …
Setting up ruby-net-telnet (0.1.1-2) …
Setting up xfonts-encodings (1:1.0.5-0ubuntu2) …
Setting up t1utils (1.41-4build2) …
Setting up libidn12:amd64 (1.38-4ubuntu1) …
Setting up fonts-texgyre (20180621-3.1) …
Setting up libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up ruby-webrick (1.7.0-3ubuntu0.2) …
Setting up libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Setting up fonts-lmodern (2.004.5-6.1) …
Setting up libcmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) …
Setting up fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Setting up pandoc-data (2.9.2.1-3ubuntu2) …
Setting up ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Setting up libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libgs9-common (9.55.0~dfsg1-0ubuntu5.12) …
Setting up teckit (2.5.11+ds1-1) …
Setting up libpdfbox-java (1:1.8.16-2) …
Setting up libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.12) …
Setting up preview-latex-style (12.2-1ubuntu1) …
Setting up libcommons-parent-java (43-1) …
Setting up dvisvgm (2.13.1-1) …
Setting up libcommons-logging-java (1.2-2) …
Setting up xfonts-utils (1:7.7+6build2) …
Setting up libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up pandoc (2.9.2.1-3ubuntu2) …
Setting up texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) in auto mode
Setting up lmodern (2.004.5-6.1) …
Setting up texlive-base (2021.20220204-1) …
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
```

```
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST…
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN…
mktexlsr: Updating /var/lib/texmf/ls-R…
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/tex-
ini-files/pdftexconfig.tex
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
Setting up tex-gyre (20180621-3.1) …
Setting up texlive-plain-generic (2021.20220204-1) …
Setting up texlive-latex-base (2021.20220204-1) …
Setting up texlive-latex-recommended (2021.20220204-1) …
Setting up texlive-pictures (2021.20220204-1) …
Setting up texlive-fonts-recommended (2021.20220204-1) …
Setting up tipa (2:1.3-21) …
Setting up texlive-latex-extra (2021.20220204-1) …
Setting up texlive-xetex (2021.20220204-1) …
Setting up rake (13.0.6-2) …
Setting up libruby3.0:amd64 (3.0.2-7ubuntu2.10) …
Setting up ruby3.0 (3.0.2-7ubuntu2.10) …
Setting up ruby (1:3.0~exp1) …
Setting up ruby-rubygems (3.3.5-2) …
Processing triggers for man-db (2.10.2-1) …
Processing triggers for mailcap (3.70+nmu1ubuntu1) …
Processing triggers for fontconfig (2.13.1-4.2ubuntu5) …
Processing triggers for libc-bin (2.35-0ubuntu3.8) …
/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libhwloc.so.15 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtcm.so.1 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero_v2.so.0 is not a
symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic
```

link

/sbin/ldconfig.real: /usr/local/lib/libumf.so.0 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero.so.0 is not a
symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtcm_debug.so.1 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_opencl.so.0 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libur_loader.so.0 is not a symbolic link

Processing triggers for tex-common (6.17) …
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based
frontend cannot be used. at /usr/share/perl5/Debconf/FrontEnd/Dialog.pm line
78.)
debconf: falling back to frontend: Readline
Running updmap-sys. This may take some time… done.
Running mktexlsr /var/lib/texmf … done.
Building format(s) --all.
        This may take some time… done.

[6]: `!jupyter nbconvert --to pdf "/content/drive/MyDrive/Colan_Notebooks/FrankenBERT.`
   `↪ipybn"`

[NbConvertApp] WARNING | pattern
'/content/drive/MyDrive/Colan_Notebooks/FrankenBERT.ipybn' matched no files
This application is used to convert notebook files (*.ipynb)
        to various other formats.

        WARNING: THE COMMANDLINE INTERFACE MAY CHANGE IN FUTURE RELEASES.

Options
=======
The options below are convenience aliases to configurable class-options,
as listed in the "Equivalent to" description-line of the aliases.
To see all configurable class-options for some <cmd>, use:
    <cmd> --help-all

--debug
    set log level to logging.DEBUG (maximize logging output)

```
    Equivalent to: [--Application.log_level=10]
--show-config
    Show the application's configuration (human-readable format)
    Equivalent to: [--Application.show_config=True]
--show-config-json
    Show the application's configuration (json format)
    Equivalent to: [--Application.show_config_json=True]
--generate-config
    generate default config file
    Equivalent to: [--JupyterApp.generate_config=True]
-y
    Answer yes to any questions instead of prompting.
    Equivalent to: [--JupyterApp.answer_yes=True]
--execute
    Execute the notebook prior to export.
    Equivalent to: [--ExecutePreprocessor.enabled=True]
--allow-errors
    Continue notebook execution even if one of the cells throws an error and
include the error message in the cell output (the default behaviour is to abort
conversion). This flag is only relevant if '--execute' was specified, too.
    Equivalent to: [--ExecutePreprocessor.allow_errors=True]
--stdin
    read a single notebook file from stdin. Write the resulting notebook with
default basename 'notebook.*'
    Equivalent to: [--NbConvertApp.from_stdin=True]
--stdout
    Write notebook output to stdout instead of files.
    Equivalent to: [--NbConvertApp.writer_class=StdoutWriter]
--inplace
    Run nbconvert in place, overwriting the existing notebook (only
            relevant when converting to notebook format)
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=]
--clear-output
    Clear output of current file and save in place,
            overwriting the existing notebook.
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--ClearOutputPreprocessor.enabled=True]
--coalesce-streams
    Coalesce consecutive stdout and stderr outputs into one stream (within each
cell).
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--CoalesceStreamsPreprocessor.enabled=True]
--no-prompt
    Exclude input and output prompts from converted document.
    Equivalent to: [--TemplateExporter.exclude_input_prompt=True
```

```
--TemplateExporter.exclude_output_prompt=True]
--no-input
    Exclude input cells and output prompts from converted document.
            This mode is ideal for generating code-free reports.
    Equivalent to: [--TemplateExporter.exclude_output_prompt=True
--TemplateExporter.exclude_input=True
--TemplateExporter.exclude_input_prompt=True]
--allow-chromium-download
    Whether to allow downloading chromium if no suitable version is found on the
system.
    Equivalent to: [--WebPDFExporter.allow_chromium_download=True]
--disable-chromium-sandbox
    Disable chromium security sandbox when converting to PDF..
    Equivalent to: [--WebPDFExporter.disable_sandbox=True]
--show-input
    Shows code input. This flag is only useful for dejavu users.
    Equivalent to: [--TemplateExporter.exclude_input=False]
--embed-images
    Embed the images as base64 dataurls in the output. This flag is only useful
for the HTML/WebPDF/Slides exports.
    Equivalent to: [--HTMLExporter.embed_images=True]
--sanitize-html
    Whether the HTML in Markdown cells and cell outputs should be sanitized..
    Equivalent to: [--HTMLExporter.sanitize_html=True]
--log-level=<Enum>
    Set the log level by value or name.
    Choices: any of [0, 10, 20, 30, 40, 50, 'DEBUG', 'INFO', 'WARN', 'ERROR',
'CRITICAL']
    Default: 30
    Equivalent to: [--Application.log_level]
--config=<Unicode>
    Full path of a config file.
    Default: ''
    Equivalent to: [--JupyterApp.config_file]
--to=<Unicode>
    The export format to be used, either one of the built-in formats
            ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook',
'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides', 'webpdf']
            or a dotted object name that represents the import path for an
            ``Exporter`` class
    Default: ''
    Equivalent to: [--NbConvertApp.export_format]
--template=<Unicode>
    Name of the template to use
    Default: ''
    Equivalent to: [--TemplateExporter.template_name]
--template-file=<Unicode>
    Name of the template file to use
```

```
    Default: None
    Equivalent to: [--TemplateExporter.template_file]
--theme=<Unicode>
    Template specific theme(e.g. the name of a JupyterLab CSS theme distributed
    as prebuilt extension for the lab template)
    Default: 'light'
    Equivalent to: [--HTMLExporter.theme]
--sanitize_html=<Bool>
    Whether the HTML in Markdown cells and cell outputs should be sanitized.This
    should be set to True by nbviewer or similar tools.
    Default: False
    Equivalent to: [--HTMLExporter.sanitize_html]
--writer=<DottedObjectName>
    Writer class used to write the
                                        results of the conversion
    Default: 'FilesWriter'
    Equivalent to: [--NbConvertApp.writer_class]
--post=<DottedOrNone>
    PostProcessor class used to write the
                                        results of the conversion
    Default: ''
    Equivalent to: [--NbConvertApp.postprocessor_class]
--output=<Unicode>
    Overwrite base name use for output files.
                Supports pattern replacements '{notebook_name}'.
    Default: '{notebook_name}'
    Equivalent to: [--NbConvertApp.output_base]
--output-dir=<Unicode>
    Directory to write output(s) to. Defaults
                                    to output to the directory of each notebook.
To recover
                                    previous default behaviour (outputting to the
current
                                    working directory) use . as the flag value.
    Default: ''
    Equivalent to: [--FilesWriter.build_directory]
--reveal-prefix=<Unicode>
    The URL prefix for reveal.js (version 3.x).
            This defaults to the reveal CDN, but can be any url pointing to a
copy
            of reveal.js.
            For speaker notes to work, this must be a relative path to a local
            copy of reveal.js: e.g., "reveal.js".
            If a relative path is given, it must be a subdirectory of the
            current directory (from which the server is run).
            See the usage documentation
            (https://nbconvert.readthedocs.io/en/latest/usage.html#reveal-js-
html-slideshow)
```

```
            for more details.
    Default: ''
    Equivalent to: [--SlidesExporter.reveal_url_prefix]
--nbformat=<Enum>
    The nbformat version to write.
            Use this to downgrade notebooks.
    Choices: any of [1, 2, 3, 4]
    Default: 4
    Equivalent to: [--NotebookExporter.nbformat_version]

Examples
--------

    The simplest way to use nbconvert is

            > jupyter nbconvert mynotebook.ipynb --to html

            Options include ['asciidoc', 'custom', 'html', 'latex', 'markdown',
'notebook', 'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides',
'webpdf'].

            > jupyter nbconvert --to latex mynotebook.ipynb

            Both HTML and LaTeX support multiple output templates. LaTeX
includes
            'base', 'article' and 'report'.  HTML includes 'basic', 'lab' and
            'classic'. You can specify the flavor of the format used.

            > jupyter nbconvert --to html --template lab mynotebook.ipynb

            You can also pipe the output to stdout, rather than a file

            > jupyter nbconvert mynotebook.ipynb --stdout

            PDF is generated via latex

            > jupyter nbconvert mynotebook.ipynb --to pdf

            You can get (and serve) a Reveal.js-powered slideshow

            > jupyter nbconvert myslides.ipynb --to slides --post serve

            Multiple notebooks can be given at the command line in a couple of
            different ways:

            > jupyter nbconvert notebook*.ipynb
            > jupyter nbconvert notebook1.ipynb notebook2.ipynb
```

or you can specify the notebooks list in a config file, containing::

        c.NbConvertApp.notebooks = ["my_notebook.ipynb"]

    > jupyter nbconvert --config mycfg.py

To see all available configurables, use `--help-all`.

```python
[7]: import os

     # List contents of your Google Drive directory
     drive_path = '/content/drive/MyDrive/'
     print(f"Listing contents of: {drive_path}")
     try:
         for item in os.listdir(drive_path):
             print(item)
     except FileNotFoundError:
         print(f"Directory not found: {drive_path}")
```

```
Listing contents of: /content/drive/MyDrive/
Ids
DSI-Job Readiness Directory - Vinod
Colab_Notebooks
```