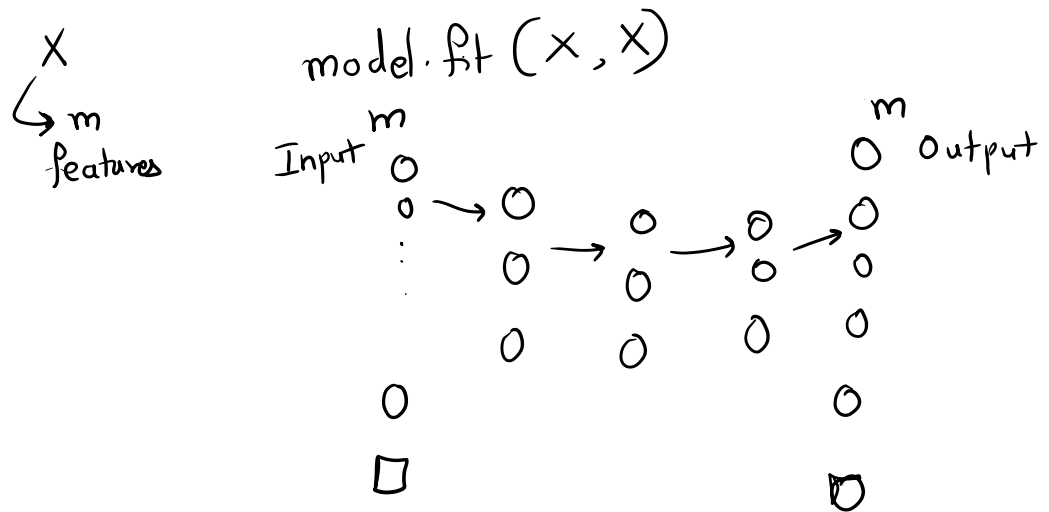
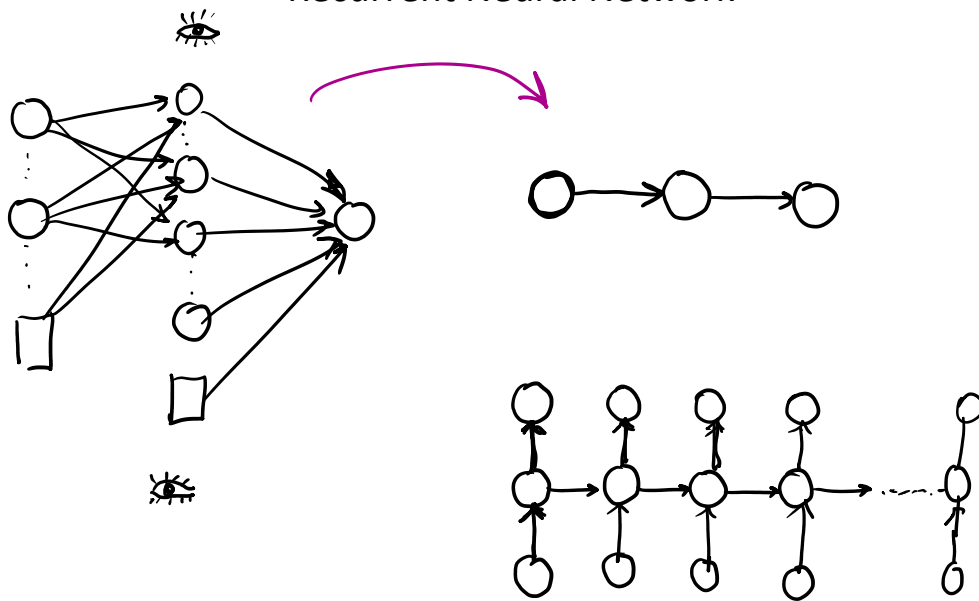


Auto-encoders : Unsupervised Learning



Recurrent Neural Network



```
X_train = []
y_train = []
for i in range(timesteps, trn_size):
    X_train.append(training_set_scaled[i-timesteps:i, 0])
    y_train.append(training_set_scaled[i, 0])
X_train, y_train = np.array(X_train), np.array(y_train)
```

$i=10$ train set $[0:10, 0]$

1709	1646	1794	1878	2173	2321	2468	2416	2184	2121
------	------	------	------	------	------	------	------	------	------

training_set

0	1709
1	1646
2	1794
3	1878
4	2173
5	2321
6	2468
7	2416
8	2184
9	2121
10	1962

y_{trn}

i=11

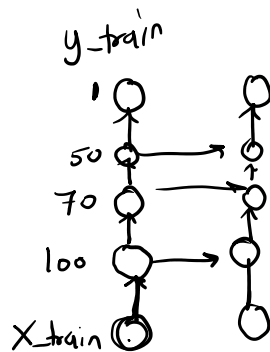
trainset[1:11,0]

1709	1646	1794	1878	2173	2321	2468	2416	2184	2121	1962
------	------	------	------	------	------	------	------	------	------	------

2184
2121
1962
1825
1751

1646	1794	1878	2173	2321	2468	2416	2184	2121	1962	1825
------	------	------	------	------	------	------	------	------	------	------

```
tf.random.set_seed(seed=2022)
model = keras.Sequential([
    tf.keras.layers.LSTM(units=100,return_sequences = True,
                        input_shape= (X_train.shape[1],X_train.shape[2]) ),
    tf.keras.layers.LSTM(units=70,return_sequences = True ) ,
    tf.keras.layers.LSTM(units=50 ) ,
    tf.keras.layers.Dense(1)
])
model.compile(optimizer = 'adam', loss = 'mean_squared_error')
```



FRED-NROUST.csv

Timesteps = 5

Test: Last 8 observations

BUNDESBANK-BBK01_WT5511.csv

Timesteps = 5, 10, 3

Test: Last 10 observations