Report on CS677 Final Project

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a. problem statement:

The goal of this project is to predict the real S&P500 Index returns.

b. data set with a link and feature description:

<https://finance.yahoo.com/quote/SPY/history?period1=1482969600&period2=1640131200&interval=1d&filter=history&frequency=1d&includeAdjustedClose=true>

Previous 20 days’ return values were used as features to predict the 21st day’s return value.

c. your model and hyperparameters. how long it takes for you to train the model:

TCN. It takes about 2-3 minutes to train this model. Input\_shape is (TimeSteps,1), where TimeSteps is the number of days used to predict the next return. We set it as 20.

model **=** Sequential()

model**.**add(Conv1D(filters**=**64, kernel\_size**=**3, activation**=**'relu', input\_shape**=**(TimeSteps,1)))

model**.**add(Conv1D(filters**=**32, kernel\_size**=**3, activation**=**'relu'))

model**.**add(Dropout(0.2))

model**.**add(MaxPooling1D(pool\_size**=**2))

model**.**add(Flatten())

model**.**add(Dense(50, activation**=**'relu'))

model**.**add(Dense(1))

model**.**compile(loss**=**'mean\_squared\_error', optimizer**=**'adam')

model**.**fit(X\_train,Y\_train,validation\_data**=**(X\_test,Y\_test),verbose**=**2,epochs**=**1000)

d. baseline, metrics, and performance evaluation:

Baseline models: SimpleRNN, LSTM, GRU

Metrics used to evaluate the models: RMSE

e. group members and contributions of each member:

Data Preparation: Shivani

SimpleRNN, TCN: Aigerim

LSTM: Shivani

GRU: Soham

Evaluate the Model: Aigerim

Parameter Tuning: Soham

Make Predictions: Shivani

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| --- | --- | --- |
|  | **Predicted Return** | **Actual Return** |
| 12/13/21 | 0.00064314 | -0.008858 |
| 12/14/21 | -0.00035651 | -0.00688 |
| 12/15/21 | 0.00303573 | 0.015625 |
| 12/16/21 | -0.00755137 | -0.008819 |
| 12/17/21 | -0.00691789 | -0.014107 |