**Appendix**

Table 1 Initial models and results

| Models | Initial parameters | RMSE |
| --- | --- | --- |
| Linear | copy\_X: True, fit\_intercept: True, normalize: False | 1.01083 |
| Ridge | 'alpha': 128, 'copy\_X': True, 'fit\_intercept': True, 'normalize': False | 1.01060 |
| Lasso | 'alpha': 128, 'copy\_X': True, 'fit\_intercept': True, 'normalize': False | 1.01059 |
| Bayesian ridge regression | 'alpha\_init': 1  'lambda\_init': 1 | 1.01016 |
| AdaBoosting | 'base\_estimator' : DecisionTreeRegressor(), 'base\_estimator\_\_min\_samples\_leaf': 5  'n\_estimators': 50,  'learning\_rate': 0.01 | 1.03695 |
| XGBoost | Max\_depth=10, n\_estimators=1000, min\_child\_weight=0.5, colsample\_bytree=0.8, subsample=0.8,eta=0.1,seed=42 | 0.91755 |
| LightGBM | 'objective': 'rmse',  'metric': 'rmse',  'num\_leaves': 35,  'min\_data\_in\_leaf':10,  'feature\_fraction':0.5,  'learning\_rate': 0.05,  'num\_rounds': 900, | 0.91315 |
| ExtraTrees | n\_estimators=50  random\_state=0 | 0.94308 |
| Random Forest | n\_estimators=60, min\_samples\_leaf=15, n\_jobs=-1, random\_state=0 | 0.93246 |
| Gradient Boosting | random\_state=0 | 1.13437 |
| LSTM | epochs = 20,  batch = 128,  lr = 0.0001,  Activation: Relu,  Optimizer: Adam | 1.01024 |

Table 2 Tuned models and results

| Bayesian ridge regression | 'alpha\_init': 1.5, 'lambda\_init': 1e-07 | 1.01016 |
| --- | --- | --- |
| AdaBoosting | Tuning failed due to memory limit |  |
| XGBoost | max\_depth=8,  n\_estimators=1000,  min\_child\_weight=300,  colsample\_bytree=0.8,  subsample=0.8,  eta=0.3,  seed=42,  num\_leaves= 1023,  min\_data\_in\_leaf=10,  feature\_fraction=0.7,  learning\_rate= 0.01,  early\_stopping\_rounds = 30,  gamma = 0.8 | 0.91616 |
| LightGBM | Objective : 'rmse',  metric: 'rmse',  num\_leaves: 1023,  min\_data\_in\_leaf:10,  feature\_fraction:0.7,  learning\_rate: 0.01, #0.01  num\_rounds: 1000,  early\_stopping\_rounds: 30,  seed: 1 | 0.90984 |
| ExtraTrees | random\_state=10,  max\_depth=50,  min\_samples\_split=10,  min\_samples\_leaf=40,  n\_estimators=50 | 0.89930 |
| LSTM (Technical issue, no GPU) | batch\_size = 4096,  epochs = 10,  lr = 0.0001  Activation: Relu  Optimizer: Adam | 1.00609 |
| RandomForest | Tuning failed due to memory limit |  |