

Appendix

Comments: we have done the tuning process on a set of models, some failed due to computer hardware limitation (not enough memory). Nevertheless, we had tried and made every effort to gain better performance of the models and to do as best as we can in the project.

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	0.94308

	random_state=0	
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

Models	Tuned parameters	RMSE
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,	0.90984

	feature_fraction:0.7, learning_rate: 0.01, #0.01 num_rounds: 1000, early_stopping_rounds: 30, seed: 1	
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	