Time Series Forecasting:
Machine Learning and Deep Learning with R and Python
-Course Syllabus-

Lecture 1: Time Series Manipulations, Transformations & Visualizations

Manipulations:
- summarizing by time
- padding by time
- filtering by time
- mutating by time
- joining by time

Transformations:
- variance reduction
- range reduction
- smoothing
- rolling averages
- missing values imputation
- anomaly detection and cleaning
- lags and differencing
- Fourier transforms
- confined intervals

Visualizations:
- time series
- autocorrelations
- cross-correlations
- smoothing
- seasonality
- time series decomposition
- anomaly detection
- time series regressions

Lecture 2: Time Series Features Engineering

Feature Engineering:
- time-based features
- trend-based features
- seasonal features
- interaction features
- rolling average features
- lag features
- Fourier features
- event data features
- external features

Tidymodel:
- recipes
- workflows

Lecture 3: Tidymodel & Modeltime

Tidymodel:
- package framework

Modeltime:
- package framework
- algorithm specifications
- workflows
- calibration
- evaluation
- refitting
- forecasting

Lecture 4: Time Series Models

Forecasting Methods:
- Naive / Seasonal Naive
- Window Functions
- S-ARIMA-X
- Exponential Smoothing
- TBATS
- STLM (Decomposition models)
- Facebook's Prophet

Lecture 5: Machine Learning Models

Forecasting Methods:
- Linear Regression
- Elastic Net
- MARS
- SVM
- KNN
- Random Forest
- Boosting
- Cubist
- Neural Network

Lecture 6: Boosting Time Series Models

Forecasting Methods:
- ARIMA Boost
- Prophet Boost

Lecture 7: Deep Learning Models

Forecasting Methods:
- GluonTS Deep AR
- GluonTS NBEATS
- GluonTS GP Forecaster
- GluonTS Deep State
- Torch Deep AR

Lecture 8: Automatic Machine Learning

Forecasting Methods:
- H2O

Lecture 9: Hyperparameter Tuning

Methods:
- Sequential
- Non-Sequential

Cross Validation:
- Time Series Cross Validation
- V-Fold Cross Validation
- Grid Searches

Lecture 10: Ensemble Learning

Forecasting Methods:
- Simple Averaging Ensemble
- Weight Averaging Ensemble
- Stacking and Metalearning
- Multi-level Ensemble

Lecture 11: Recursive Machine Learning Forecasting

ML Recursivity:
- single time series recursive modelling
- panel data recursive modelling