15. November

OPENCAMPUS.sh

Time Series Prediction

WEEK 4

TOWARDS MULTIDIMENSIONAL SETTINGS: SARIMA + VAR + VARMAX MODELS

ATTENDANCE REGISTRATION

Online:

- **Use your full names in the zoom meetings!**
- **Only counts as attended with camera on.**

- **Organizational Matters:**
  - **Projects**

- **Session 4:**
  - **SARIMAX**
  - **VAR**
  - **VARMAX**

SESSION 4:

THE SARIMAX-MODEL:

KEY TAKEAWAYS:

- The SARIMAX model allows for adding external variables to the SARIMA model.
- SARIMAX has two types of variables:
  - Endogenous: The target variable
  - Exogenous: The external variables
- You need to specify the future values of the exogenous variable when forecasting.
- Therefore, when using exogenous variables, it is important to know that you have fixed information for the future about them.
  - A variable like holidays can work, as you know which holidays will occur in the future.
  - A variable like weather cannot work, as you will not know which weather will occur in the future.

THE VAR-MODEL:

KEY TAKEAWAYS:

- The VAR model uses multivariate correlation to make one model for multiple target variables
- The order of the VAR model, p, determines the number of time steps back that are used for predicting the future.
- The VAR model implementation can define the ideal number of lags using the maxlags parameter and the Akaike Information Criterion.
- The VAR model needs to estimate a large number of parameters, which makes it require a huge amount of historical data.
- This makes it difficult to estimate higher lags.

THE VARMAX-MODEL:

KEY TAKEAWAYS:

- The VARMAX model consists of:
  - V for vector: it is a multivariate model as it models multiple time series at the same time
  - AR for autoregression
  - MA for moving average
  - X for the addition of exogenous variables.
- The VARMAX(p,q) model takes two hyperparameters:
  - p for the order of the AR part
  - q for the order of the MA part
- The time series in a VARMAX have to be stationary !!

TASKS UNTIL NEXT WEEK

- **Completion of the learning material of week 4: watch the GARCH+Copula-Videos**

- **Complete/prepare the IPython-Notebooks:**
- **i.e. GARCH: Energy**
- **i.e. DCC-GARCH: Finance-1**
- **i.e. Copula: Environment**
- **i.e. Copula-GARCH: Finance2**

- Check out the GitHub-Repos:
- https://github.com/kboroz/TimeSeriesPredictionWS2023
- https://github.com/Apress/advanced-forecasting-python

- **Bring questions!**