



TEACHING PLAN – TIME SERIES

Patrick Marques Ciarelli

TOPICS

- Content and references;
- Platform and programming language;
- Timeline;
- Evaluation.



CONTENT AND REFERENCES

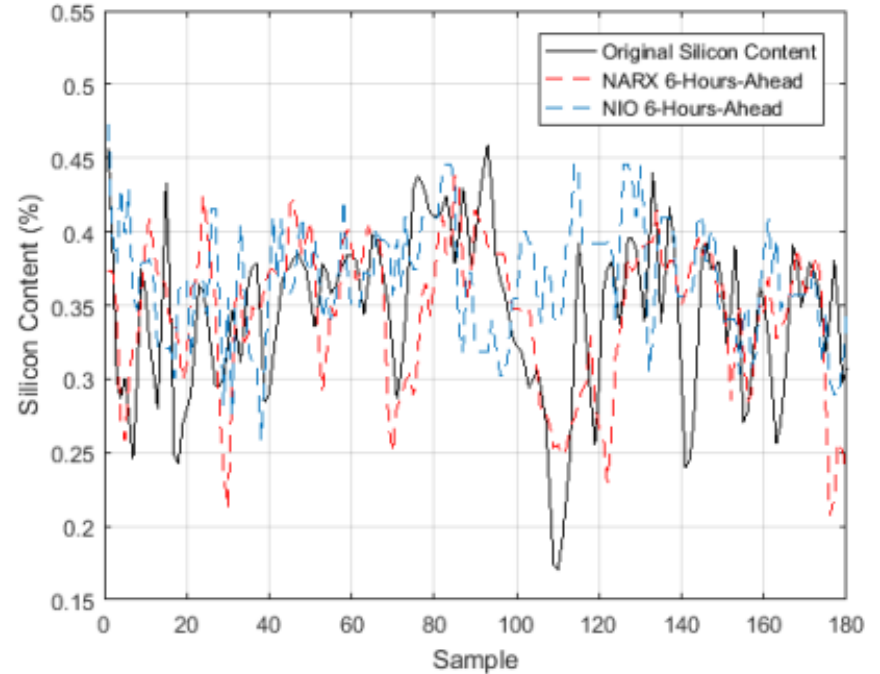
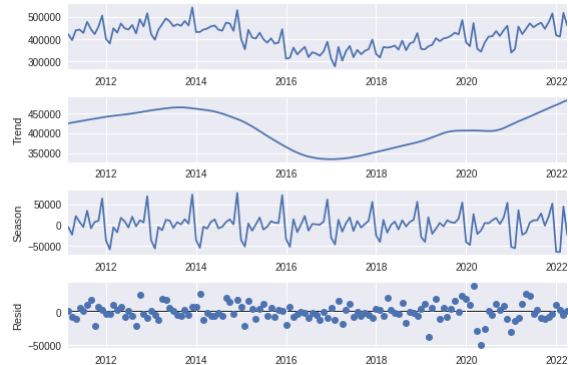
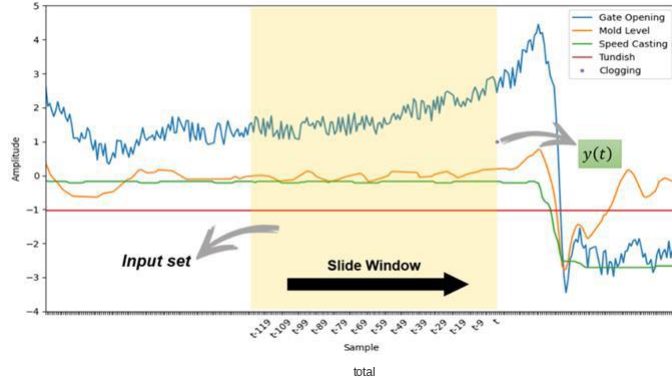
○ Content:

- Introduction to time series: Definitions, characteristics and concepts;
- Data Analysis: Data descriptors and visualization techniques;
- Treatment of data in time series: Types of anomalies (noise, outliers, missing data, etc.) and treatment strategies (interpolation, algebraic transformations, etc.);
- Strategies for complexity reduction: Decomposition and compression techniques for time series.
- Regression, prediction and classification models: Linear regression, modeling, forecasting and classification using artificial neural networks, and performance analysis.



CONTENT AND REFERENCES

Content:



CONTENT AND REFERENCES

○ Main references:

- WOOLDRIDGE, Jeffrey M. **Introductory econometrics: a modern approach**. 4th ed. United States of America: South-Western Cengage Learning, 2009.
- BOX, George E. P., JENKINS, Gwilym M.; REINSEL, Gregory C.; LJUNG, Greta M. **Time series analysis: forecasting and control**. Wiley, 5th ed., 2016.
- GOODFELLOW, IAN; BENGIO, YOSHUA; AARON, COURVILLE. **Deep learning**. MIT Press, 2016. (<https://www.deeplearningbook.org/>)
- HAYKIN, Simon S. **Neural networks and learning machines**. 3rd ed. New York, N.Y.: Prentice Hall, 2009.
- BROCKWELL, Peter J.; DAVIS, Richard A. **Introduction to time series and forecasting**. Springer, 3rd ed., 2016.



PLATFORM AND PROGRAMMING LANGUAGE

- Slides, documents, etc. will be shared in Google Classroom:
 - Access code: cwnuzvs
- Programming languages:
 - Python;
 - Matlab.



TIMELINE

○ Classes on Tuesday (4 PM to 7 PM):

Subjects	Hours
Introduction to the Course: Presentation of the Teaching Plan	1 h
Introduction to time series: Definitions, characteristics and concepts	2 h
Data analysis: Data descriptors and visualization techniques	3 h
Treatment of time series data: Types of data anomalies and treatment strategies	7 h
Complexity reduction strategies: Decomposition and compression techniques	10 h
Regression and prediction models: Linear regression, forecasting using ANN and performance analysis	10 h
Classification models: Classification using ANN and kNN, performance analysis	12 h

Test day: 10/12/2024



EVALUATION

- One test (T) and one group work (W) will be used for evaluation:

$$\text{final grade} = \frac{T + W}{2}$$

- Graduate: final grade equal or higher than 7.0:
 - Approved, otherwise final test.
- Postgraduate: final grade equal or higher than 6.0:
 - Approved.
- Minimum attendance of 75% of classes.

