# Course contents

The following assignments will be covered:

- A1: "Linear Regression"
- A2: "Logistic Regression"
- A3: "Multi-class Classification and Neural Networks"
- A4: "Neural Network Learning"
- A5: "Regularized Linear Regression and Bias/Variance"
- A6: "Support Vector Machines"
- A7: "K-Means Clustering and PCA"
- A8: "Anomaly Detection and Recommender Systems"

# First part of the workshop

Session 1:

| **Activity** | **Time** | **Remark** |
|---|---|---|
| Introduction | 42m | Self-study |
| Linear Regression with One Variable | 1h10m | Self-study |
| Linear Algebra Review | 1h | Self-study |
| Linear Regression with Multiple Variables | 1h4m | Self-study |
| Octave/Matlab Tutorial | 1h19m | |
| Work on assignment "Linear Regression" | Rest | |

Session 2:

| **Activity** | **Time** |
|---|---|
| Presentation of solution to assignment A1 | 20m |
| Logistic Regression | 1h11m |
| Regularization | 39m |
| Work on assignment A2 | Rest |

Session 3:

| Activity | Time | Remark |
|---|---|---|
| Presentation of solution to assignment A2 | 30m | |
| Neural Networks: Representation | 1h2m | Self-study |
| Neural Networks: Learning | 1h17m | Self-study |
| Work on assignments A3 and A4 | Rest | |

Session 4:

| Activity | Time | Remark |
|---|---|---|
| Presentation of solution to assignment A3 and A4 | 60m | |
| Advice for Applying Machine Learning | 1h3m | Self-study |
| Machine Learning System Design | 59m | Self-study |
| Work on assignment A5 | Rest | |

Session 5:

| Activity | Time | Remark |
|---|---|---|
| Presentation of solution to assignment A5 | 30m | |
| Support Vector Machines | 1h37m | Self-study |
| Unsupervised Learning | 39m | Self-study |
| Dimensionality Reduction | 1h7m | Self-study |
| Work on assignments A6 and A7 | Rest | |

Session 6:

| Activity | Time | Remark |
|---|---|---|

| | | |
|---|---|---|
| Presentation of solutions to assignments A6 and A7 | 60m | |
| Anormaly Detection | 1h30m | Self-study |
| Recommender Systems | 58m | Self-study |
| Work on assignment A8 | Rest | |

Session7:

| **Activity** | **Time** | **Remark** |
|---|---|---|
| Presentation of solution to assignment A8 | 30m | |
| Large Scale Machine Learning | 1h3m | Self-study |
| Application Example: Photo OCR | 56m | Self-study |
| Guest lecture TBD | Approx 45m | |
| Outstanding issues | Rest | |

# Second part of the workshop

| **Activity** | **Time** | **Remark** |
|---|---|---|
| Presentation and discussion of machine learning papers | 4h | Prepare presentation of selected paper(s). |

List of papers:

Electricity Consumption w.r.t. various measurements:

- Forecasting uncertainty of Thailand's electricity consumption compare with using artificial neural network and multiple linear regression methods, IEEE Conference on Industrial Electronics and Applications, 2017
- Forecasting household electricity consumption in the province of Aceh using combination time series model, International Conference on Electrical Engineering and Informatics, 2017
- A hybrid method for short-term electricity consumption prediction, IEEE Conference of the Industrial Electronics Society, 2017

- Prediction of electricity consumption based on DT and RF: An application on USA country power consumption, IEEE International Conference on Electrical, Instrumentation and Communication Engineering, 2017
- Short-term electricity consumption forecast with artificial neural networks — A case study of office buildings, IEEE Manchester PowerTech, 2017
- Support Vector Regression for Electricity Consumption Prediction in a Building in Japan, IEEE International Conference on Computational Science and Engineering, 2017
- Estimation of the electricity consumption of Turkey trough artificial neural networks, IEEE International Symposium on Computational Intelligence and Informatics, 2016
- A hybrid forecasting method of electricity consumption based on trend extrapolation theory and LSSVM, IEEE PES Asia-Pacific Power and Energy Engineering Conference, 2016
- Multivariate electricity consumption prediction with Extreme Learning Machine, International Joint Conference on Neural Networks, 2016

Classification of (malware) software:

- Malware Visualization for Fine-Grained Classification, IEEE Access, 2018
- Malware classification with LSTM and GRU language models and a character-level CNN, IEEE International Conference on Acoustics, Speech and Signal Processing, 2017
- Malware classification using static analysis based features, IEEE Symposium Series on Computational Intelligence, 2017
- Classification of Malware programs using autoencoders based deep learning architecture and its application to the microsoft malware Classification challenge (BIG 2015) dataset, IEEE National Aerospace and Electronics Conference, 2017
- NLP-based approaches for malware classification from API sequences, Asia Pacific Symposium on Intelligent and Evolutionary Systems, 2017
- Deep android malware detection and classification, International Conference on Advances in Computing, Communications and Informatics, 2017
- Evolving Deep Neural Networks architectures for Android malware classification, IEEE Congress on Evolutionary Computation, 2017
- Empowering convolutional networks for malware classification and analysis, International Joint Conference on Neural Networks, 2017
- On the effectiveness of application characteristics in the automatic classification of malware on smartphones, International Conference on Malicious and Unwanted Software, 2016