

Module title Tensorflow for Applied Machine Learning				
Module code tba	Level Bachelor (B.Sc.)	Hours per week 4	ECTS credits 5	Duration 3 weeks
Module instructor Dr. Viet-Trung Tran Assistant Professor, Hanoi University of Science and Technology, Vietnam		Lecture type Regular lecture, on line consultations, in-class exercises	Prerequisite(s) Good academic standing	Grading Coursework
Objectives <ul style="list-style-type: none"> • Understand Machine Learning and Artificial Neural Networks • Understand Tensorflow Concepts and its Dataflow Graphs • Understand Recurrent Neural Networks (RNNs) • Understand Convolutional Neural Networks (CNNs) • Code and Employ Linear and Logistic Regression • Code and Employ Image Classification • Code and Employ Neural Language Model • Code and Employ Neural Machine Translation 				
Content <ul style="list-style-type: none"> • Artificial Neural Networks <ul style="list-style-type: none"> ○ Perceptrons and sigmoid activation function ○ Loss function ○ Gradient descent algorithm ○ Backpropagation • Overview of Tensorflow <ul style="list-style-type: none"> ○ Graphs and sessions ○ Operations ○ Eager execution ○ Tensorboard ○ Variable sharing • Linear and Logistic Regression <ul style="list-style-type: none"> ○ Reading datasets ○ Converting data to tensor ○ Loss function and optimizers ○ Dropout • Image Classification <ul style="list-style-type: none"> ○ Example: MNIST and Imagenet datasets ○ Convolutional neural network • Neural Language Model <ul style="list-style-type: none"> ○ Distributed representations of words ○ Recurrent neural network ○ Next word prediction • Neural Machine Translation <ul style="list-style-type: none"> ○ English – German translation ○ Seq2Seq model ○ Attention mechanisms <p>Ps.</p> <ul style="list-style-type: none"> • This module will provide students with knowledge of Tensorflow and applied machine learning. • All class assignments will be in Python. The students will be fine if they have programming experience in a different language. 				

- The students will have hands-on experiences on the whole process of data preparation, model definition, model training, troubleshooting and optimizing in order to solve real-world problems: image classification, neural language model, and neural machine translation

Textbook/teaching material

- Chip Huyen, Michael Straka, Pedro Garzon. CS 20: Tensorflow for Deep Learning Research. Stanford University. <http://web.stanford.edu/class/cs20si/>
- Bengio Y., Goodfellow, I.J. and Courville, A. (2015). Deep Learning. MIT Press. <http://www.deeplearningbook.org/>
- Andrew Ng. Deep learning specialization. <https://www.deeplearning.ai/>

Note: this is not the official course descriptor according to the "Studien- und Prüfungsordnung" (SPO)