HUST

ĐẠI HỌC BÁCH KHOA HÀ NỘI

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

ONE LOVE. ONE FUTURE.

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Introduction to
Machine Learning and Data Mining

IT3190

Lecture: Course overview

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About the course

- Period: 15 weeks
  - Lectures: 11-13 weeks
  - Project report: 2-3 weeks
- Lecture directory:
- Time & location:

- Question + advice:
  - Building B1
- Join and discuss somethings with us:

Contents

- Lecture 1: Introduction to Machine Learning & Data Mining
- Lecture 2: Data crawling and pre-processing
- Lecture 3: Linear regression
- Lecture 4+5: Clustering
- Lecture 6: Decision tree and Random forest
- Lecture 7: Neural networks
- Lecture 8: Support vector machines
- Lecture 9: Performance evaluation
- Lecture 10: Probabilistic models
- Lecture 11: Basics of data mining
- Lecture 12: Association rule mining
- Lecture 13: Regularization and advanced topics

Goals of the course

- Help students to have a good basic background on Machine Learning and data mining.
- Identify the main **advantages** and **limitations** of the methods/models in ML and DM.
- Be able to design & implement an ML-based system and evaluate its performance.

Some technologies/libraries

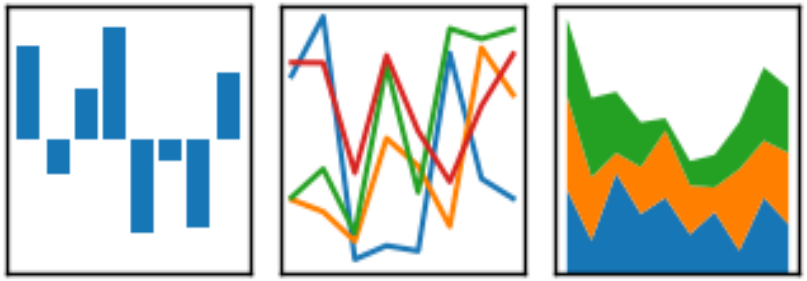
python™

ANACONDA
Powered by Continuum Analytics®

TensorFlow

pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$



Evaluation (đánh giá)

- Attendance and activeness
- Midterm test: **Capstone Project**
- Final exam
  - Paper-based or multiple-choice test
- Overall: Midterm test (40%) + Final exam (60%)

Capstone Project

- Students work in groups.
- Each group choose a problem/topic to be solved, datasets to be used, algorithms in ML or DM.
- Each proposal should be precisely described
  - The problem: short description, input, output, data type, future application, …
  - The algorithms or tools, planned to be used
  - Data sets to be used
- **Project registration:**
  - TBA

Capstone Project: requirements

- The result will be presented in the ending period of this subject. Every member is required to contribute to his/her project.
- Project report:
  - **Source code**: save your code into one zip file
  - **Readme.txt**: describes clearly how to setup, compile, and run your code
  - **Written report:**
    - Introduce the problem to be solved, the data sets were used
    - Details about the methods for analyzing data
    - Results of different evaluations, new conclusions/findings, …
    - The main components of your code
    - The difficulties in this project, and your proposed solution, …

Capstone Project: evaluation

- The evaluation of each project will be based on
  - The difficulty of the problem of interest
  - The appropriateness & quality of the chosen method/solution
  - The rigor of the empirical evaluation and assessment on the chosen method/solution
  - The quality of the presentation
  - The quality of the written report
- Each project will have 15’ for slide presentation & demo
- **If you use some existing libraries/packages/codes, you have to clearly declare your usage in the written report and slide presentation**

Some references

- Lecture slides
- Reference books:
  - T. M. Mitchell. *Machine Learning*. McGraw-Hill, 1997.
  - Trevor Hastie, Robert Tibshirani, Jerome Friedman. *The Elements of Statistical Learning*. Springer, 2017.
  - Ian Goodfellow, Yoshua Bengio, and Aaron Courville. *Deep Learning*. MIT press, 2016.
  - E. Alpaydin. *Introduction to Machine Learning*. The MIT press, 2020.
  - Jiawei Han, Micheline Kamber, Jian Pei. *Data Mining: Concepts and Techniques* (3rd Edition). Morgan Kaufmann, 2011.
- Software:
  - WEKA (http://www.cs.waikato.ac.nz/ml/weka/)
  - Scikit-Learn (http://scikit-learn.org/)
- Data for experiments: UCI repository: http://archive.ics.uci.edu/ml/

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THANK YOU !