

FIN 528

Topics in Quantitative Finance: Machine Learning for Finance Module 3 (Spring), 2016-17

Course Information

Instructor: Jaehyuk Choi

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Office Hour: Wed 3-5 PM or by appointment

Teaching Assistant: TBA

Classes:

Lectures: Monday & Thursday 1:30 – 3:20 PM

Venue: PHBS Building, Room 211

Course Website:

<https://github.com/PHBS/2016.M3.TQF-ML>

1. Course Description

1.1 Context

Course overview: The purpose of *Topics in Quantitative Finance* is to introduce students to recent trends and advanced research topics in quantitative methods of business and finance. This year's course is dedicated to machine learning (ML) for finance. ML has been one of the hottest technology in software engineering. This course will explore the possibility of applying ML to finance and business. The course will give students the basic ideas and intuition behind the popular ML methods and hands-on experience of using ML software package such as *SK-learn* and *Tensorflow* (Google). Each student is required to complete a final course project.

Prerequisites: There is no formal prerequisites. However, undergraduate-level knowledge in probability/statistics and previous experience in programming language is highly recommended.

1.2 Textbooks and Reading Materials

- *Python Machine Learning* by Sebastian Raschka ([link](#)): primary textbook (**PML**)
- *The Elements of Statistical Learning* by Hastie, Tibshirani and Friedman ([link](#)) (**ESL**)
- *Machine Learning in Coursera* taught by Andrew Ng ([link](#)) (**CML**)
- *Pattern Recognition and Machine Learning* by Christopher Bishop

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	Yes
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	Yes
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	Yes
	2.2. Students will be able to apply leadership theories and related skills.	
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyze business problems and identify the ethical aspects, provide a solution and defend it.	
	3.2. Our students will practice ethics in the duration of the program.	
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	Yes
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	Yes
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	Yes
	5.3. Our students will demonstrate competency in critical thinking.	Yes

2.2 Course specific objectives

See the course overview in 1.1.

2.3 Assessment/Grading Details

Tentative weights are as below;
Attendance 30%, Assignments 30%, Final Project 40%

2.4 Academic Honesty and Plagiarism

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to *PHBS Student Handbook*.

3. Topics, Teaching and Assessment Schedule

Week	Dates	Topics and the corresponding textbook chapters
1	Feb 20 & 23	Course overview, introduction to Python, Github, Etc
2	Feb 27 & Mar 2	Classification with SK-learn: Logistic regression, SVM, KNN using (PML Ch. 2~3)
3	Mar 6 & 9	Data processing (PML Ch. 4) Dimensionality reduction (PML Ch. 5)
4	Mar 13 & 16	Model evaluation (PML Ch. 6) Hyper-parameter tuning (PML Ch. 7)
5	Mar 20 & 23	Sentiment Analysis (PML Ch. 8) Web application (PML Ch. 9)
6	Mar 27 & 30	Final project selection and proposal
7	April 3 & 6	Regression methods (PML Ch. 10) Clustering Analysis (PML Ch. 11)
8	April 10 & 13	Artificial Neural Network & Handwritten Digits (PML Ch. 12)
9	April 17 & 20	Final projects presentation

4. Miscellaneous

- The email (jaehyuk@phbs.pku.edu.cn) is the preferred method of communication.