

RMSC4002 2017-18 Term 1
Data Analysis in Finance and Risk Management Science

Lecturer: Prof. Phillip Yam (scpyam@sta.cuhk.edu.hk) Office: LSB G19
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Time and venue: Mo 09:30-11:15 / LT3, Th 13:30-14:30 / LT4, Sep. 7th to Nov. 30th.

Syllabus

This course introduces some commonly used statistical techniques particularly of multivariate favor, introductory machine learning concepts and predictive analytics in Business Logistics, Quantitative Finance, and Risk Management Science. Statistical packages such as R and EXCEL will be used to demonstrate these methods especially in tutorial sessions. Topics covered and approximate teaching schedule are as follows:

- Multivariate normal distribution (2 weeks)
- Estimating volatilities, correlations and basic financial time series (2 weeks)
- Value-at-Risk (1 week)
- Principal component analysis and factor analysis (2 weeks)
- Binary Logistic regression and Multinomial logit (2 weeks)
- Classification / Decision Trees (1 week+)
- Artificial Neural Network (1 week+)
- K-means Cluster analysis / Nearest-neighbor algorithm (1 week+)

The materials provided will cultivate a foundation leading to effective implementation and innovation demanded in the prevailing algorithmic trading in quantitative finance.

Assessment

There will be 3 assignments totally accounting for 25% and a group project accounting for another 25% (to be submitted on or before Dec. 1st, 2017) with the remaining 50% for the final (closed book with one single page A4-size “cheat”-sheet allowed) examination, the date to be confirmed by the RES.

Course website

WebCT (<https://blackboard.cuhk.edu.hk>) will be used to post course information, announcements, notes, assignments, datasets and programs. Students are also expected to submit their assignments and project report via eLearning system.

References

Lecture notes will be given, based on which the lectures are conducted. Other recommended reference books are

1. Hull, J., Risk Management and Financial Institutions (4th ed.). Wiley. (2012)
2. Johnson, R.A. and Wichern, D.W., Applied Multivariate statistical analysis, 6th edition, Prentice Hall. (2014)

3. Ruppert, D. and Matteson, D. S., Statistics and Data Analysis for Financial Engineering. Springer. (2011)
4. Guo, X., Lai, T. L., Shek, H. and Wong, S. P. S., Quantitative Trading: Algorithms, Analytics, Data, Models, Optimization. CRC Press. (2017)
5. Lai, T. L. and Xing, H., Statistical Models and Methods for Financial Markets. Springer. (2008)
6. Friedman, J., Hastie, T. and Tibshirani, R., The Elements of Statistical Learning. Springer. (2001)
7. Domingos, P., The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World. Penguin. (2015)

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<http://www.cuhk.edu.hk/policy/academichonesty/>.