DAT 537: Final Project

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Project Instructions

Each of the two projects described below aims to help you gain some hands-on experience in processing and analyzing real marketing or financial data. Each team should consist of no more than 6 members. Each team completes both projects. Project parameters are as follows.

1. Only one student in each team should submit the team report. The report is due by 23:59 pm on December 9, 2019.

2. The first page of the report should list the name of each team member followed by the program track (MBA, MSCA, MSF in quantitative finance or MSF in corporate finance etc).

3. BOTH the knitted output file and the Rmd file used to generate the report have to be submitted.

4. The Rmd file should be such that all results are fully reproducible.

Finance Project: Diversification Effects

This project helps you observe the principle of diversification in action. Diversification means that the portfolio risk can be reduced by investing in a variety of assets.

1. Select 30 stocks that you are interested in. Find their yahoo symbols. This website can help you find the symbols that yahoo is using http://investexcel.net/all-yahoo-finance-stock-tickers/. Remember to double check the symbols at yahoo finance.

2. Download 4 years of weekly price data for each stock from June 1, 2015 to June 1, 2019. Remember this requires that all 30 stocks you select in step 1 should be available for these 4 years.

3. Assume that the desired portfolio mean return levels are .03, .06, .09 and .12, each in annual terms.

4. Now form 6 portfolios for each desired return level (each portfolio includes the risk-free asset). Each portfolio has 5, 10, 15, 20, 25 and 30 stocks. The smaller set of assets should be a subset of the larger set. For example, if you have IBM in the set of 5 stocks, you must include IBM in the portfolios of 10, 15, 20, 25 and 30 stocks.

5. Assume that the stock premium is explained by the Gaussian SURE CAPM model without an intercept.

6. Now form each portfolio, use the default training sample prior. Comment on the prior in the case of the SURE model with 15 assets.

7. Now compute the optimal portfolios for each group of assets at each target portfolio return level. Give the weights of each asset in each portfolio as well as the standard deviation of the optimal portfolios.

8. Use `ggplot` to plot the standard deviation vs. the number of stocks in the assets. Comment on your findings.

9. Redo questions 5-8 with student-t errors. For each set of assets, use log-marginal likelihoods to find the appropriate-degrees of freedom of the student-t distribution on a grid of 10 equally-spaced values between 3 and 5.

Marketing Project: Tuna Market Share

This project helps you understand how to set a price level consistent with marketing objectives.

1. Load the `tuna` data set from package `bayesm`. There are seven brands in the data set. For each brand, estimate separate independent student-t models where `logsales` for each product is regressed on an intercept, the product's log price and display activity. Use the default training sample prior and use log-marginal likelihoods to find the appropriate-degrees of freedom of the student-t distribution on a grid of 20 equally-spaced values between 3 and 6.

2. Now estimate a SURE student-t model for the seven brands. Again use marginal likelihoods to find the appropriate degrees of freedom on a grid of 20 equally-spaced values between 3 and 6. From your estimation results, which pair of products is the most correlated?

3. Now suppose you are managing the sales of Star Kist 6 oz, and you want to know what price to charge for your product, given the other six other products in the market. Suppose your main competitor is Chicken of the Sea 6 oz and you would like to generate (on average) twice the total sales compared to Chicken of the Sea 6 oz. How would you determine your own price? Assume that the other products in the market have the following attributes:

Product	Price($)	Display Activity
Star Kist 6 oz	?	0.31
Chicken of the Sea 6 oz	0.70	0.35
Bumble Bee Solid 6.12 oz	1.80	0.29
Bumble Bee Chunk 6.12 oz	0.85	0.23
Geisha 6 oz	1.40	0.35
Bumble Bee Large Cans	3.49	0.25
HH Chunk Lite 6.5 oz	0.75	0.24

In providing your solution, assume that Star Kist prices are one of these prices 0.44, 0.54, 0.64, 0.74 and 0.84 (all in dollars).