EE / CprE / SE 491 – sdmay19-07

Real Estate Portfolio Optimization

Week 7 Report

Monday, October 22 – Sunday, October 28

Client: Principal

Faculty Advisor: Chinmay Hegde

Team Members

Blake Roberts - Project Manager / Backend
Colton Goode - Meeting Scribe / Backend
Kevin Johnson - Quality Control / Frontend
Leelabari Fulbel - Meeting Facilitator / Frontend
Nickolas Moeller - Report Manager / Backend

Weekly Summary

This week we mainly focused on revising the second version of our project plan and the midpoint presentation with the stakeholders at principal. Preparation for this meeting took up a majority of our time spent this week. During our midpoint presentation, we presented our current progress and future goals for our optimization tool. Various members of Principal's real estate and data science teams were in attendance, offering useful feedback for our team. Lastly, we finished our second version of the project plan.

Past Week Accomplishments

- Midpoint presentation to client and stakeholders - Everyone
    - The team presented to various members at Principal Financial, including our immediate Principal team we work with, most of the data science team, multiple real estate investors who would be using the product, as well as a few others who watched it remotely
    - We presented the problem at hand and what our tool is trying to solve. We also updated everyone on the current state of the project, our plans for the future, and used this time to gather useful feedback with a question and answer session.
- Lee and Kevin checked various frameworks to use for the visualization of the frontend. For the purpose of keeping the frontend easy to use for Principal after we are gone, Lee and Kevin chose Dash. It is written in Python and is specifically made for making dashboards for visualizations. Revised Markowitz python script - Blake
    - The main purpose of revision was in correcting the covariance calculation.
    - Attempted to decouple return vectors and covariance calculation from Markowitz function.
- Made basis for efficient frontier in python - Colton

    - Did more research into the statistics regarding generating an efficient frontier graph
    - Was able to generate an efficient frontier graph using some stocks as an example. Got the basis set up.
    - Most guides use stocks in tutorials. More work needs to be done to tailor this to real estate investment portfolios, which are different but somewhat similar.
- Team Website Update - Nick
    - We received feedback from our advisor on how our website should look and gave use a few example team websites. Added landing page project summary, weekly meeting reports page formatting, and team introductions.
- Project Plan - Everyone
    - Review project plan v1 and reiterate. Came to a final v2 project plan. It was posted to the team website.
- Lee made a mockup of using Dash. It was capable of showing a simple bar graph with dummy data.
- Kevin determined that PowerBI had a web server called PowerBI Embedded which could be used for graph visualizations.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Blake Roberts	Adjust Markowitz implementation, Project Plan	6	36
Colton Goode	Efficient Frontier Generation, Testing Current Algorithms, Project Plan, Midpoint Presentation	6	36
Kevin Johnson	Did more research on Python, Dash, and Power BI	6	35
Leelabari Fulbel	Researched Dash. Made an example of showing graphs with current backend mockups.	6	36
Nickolas Moeller	Project Plan, Midpoint Presentation	6	36

Pending Issues

- Issues with the calculation of a covariance matrix. This is a bottleneck for moving on with the implementation as this matrix is needed in other parts of the code. We will be meeting with our main point of contact, Ben, for help with this soon.
- Optimization not producing reasonable weights (related to covariance matrix issue)
- Efficient frontier working with dummy data, but needs correct optimization data to function properly. Will put aside for now to focus on other aspects.

Plans for Coming Week

- Everyone will continue research into MPT, specifically Markowitz
- Lee and Kevin will do more research into using Power BI.
- Lee and Kevin will create a basic dashboard displaying CSV data using Dash code.
- Correct covariance matrix - Blake, Cole, and Nick
    - Consult Ben at Principal for assistance
- Begin writing data analytics/backend unit tests - Blake, Cole, and Nick
    - Use the unittest package to implement backend unit tests.
- Begin forming standardized data format - Blake

RASIC

Our client desires weekly RASIC tables to be submitted every Monday detailing the tasks to be completed and to keep which team members are involved in each task. It also records which member at Principal Financial is (if they are) directly involved with a particular task or not.

R: Responsible
- The team member primarily responsible for the task's completion.

A: Approve
- The team member responsible for approving the task's completion.

S: Supporting
- The team member(s) who support the task's completion.

I: Informed
- The Principal team member(s) who are informed of decisions, progress, and completion associated with the task.

C: Consulted
- The Principal team member(s) who serve as Subject Matter Experts or key stakeholders for the task or project as a whole.

Past Weeks RASIC:

10/22/2018

	Team Members					Principal Team		
Task	Blake	Cole	Kevin	Lee	Nick	Ben	Jonathan Ling	Jonathan Frank
Make Dash prototype			S	R			S	
Revise and extend Markowitz implementation	R				S			
Architecture Block Diagram w/ Dash	R							
Make a Decision on FE implementation	R	R	R	R	R			

Next Weeks RASIC:

10/29/2018								
	Team Members					Principal Team		
Task	Blake	Cole	Kevin	Lee	Nick	Ben	Jonathan Ling	Jonathan Frank
Research PowerBI			R	R		C		
Combine Dash with current Backend	S		R	R				
Correct covariance matrix	S	R			S			
Backend markowitz/data unit tests	S	S			R			
Outline standard data structures (portfolio, expected returns, covariance matrix)	R				S	C		