**Phase-2 Model Prediction:**

Fama, French suggest that a 5-factor model based on size, value, profitability, investment patterns and excess market returns provides an adequate description of stock returns. The performance of the model is not sensitive to the specifics of the way its factors are defined.

Also, Asness et al suggest that high quality stocks provide higher expected returns and in turn command higher prices. They create a quality metric and build a strategy in which we take a long position in high quality stock and simultaneously short a low quality stock.

By modifying the 5-factor model and replacing the size measure to use the quality measure in fixing the anomalies of the size effect in the 5-factor model. We can make the expected stock predictions are more accurate, as suggested by Asness et al.

**Phase 3: Optimization**

We came across a couple of literature that build and improve upon the popular Markowitz way to optimize a portfolio of financial assets.

One way is to design the optimization problem as an iterative two stage process. The first step focuses on minimizing value at risk while the second step dynamically maximizes the value of the stock portfolio.

Another algorithm draws upon the genetic theory of evolution where we start with a population of stocks, select “best” stocks based on certain selection method, generate random weights for these stocks and create a new population. The process is repeated until we have the optimized the weights (percentages of total investments recommended for the user) to come up with the best subset of stocks.

By incorporating such optimization technique on top of our predicted returns we propose to improve the selection of stocks done in Phase 1.

**Phase 4: Web-based UI**

The final solution that we propose to deliver is an interactive UI. There are existing pieces of works that focus on providing visualization tools that help customers compare different portfolios. We plan to draw upon the efficiency of using certain visualization techniques to our objective where the user only needs to provide their expected returns, time horizon and sector of interest. Based on these inputs, the UI would provide recommendations on best set of stocks and percentage of total investment for each stock.

**Citation:**

Quality minus Junk: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2312432>

Size matters if you control your junk: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2553889>

A Five-factor Asset Pricing Model: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2287202>