**Introduction**

From the time stocks became easily tradable, people have been looking for viable short term trading strategies to make them money. Many of these strategies rely on mathematical formulae to indicate when to buy and sell stocks. With the assistance of programming, a user could test these theories and show their predicted returns in a concrete way. For this project I have decided to take one of those strategies and show how it plays out based on user inputs.

**Abstract**

Using the Bollinger Bands price action trading strategy, this app will show the results of trading using variable standard deviation multipliers, moving average ranges, and stock symbols. The computer will calculate buy and sell signals based on the variables selected on historical stock price data for a range of 5 years. All data from simulations will be added to a graph that shows the most reliably effective strategies, though I expect none of them will outperform buy/hold strategies.

**Display**

The app will have 4 pages to display:

Run Simulation Page

The first page will render when a user first visits the app. It will display options for choosing variables for their trading strategy. Options for standard deviation multiplier will be between 0.5 and 3, in increments of 0.1. Options for moving average range will be between 15 and 30 days, in increments of 1. Stock symbols will be selected from companies in the S&P 500. Including all variables, this will allow for more than 100000 different running conditions. On submit, results will be calculated and the user will be taken to the results page.

Results Page

This page will show the simulated return per time that stocks were held. A large result number will show how that number compares to buying and holding the stock over the same period. Beneath that, a small description of performance will be displayed. Other figures that will be shown include how many stocks were bought and sold through the simulation and percentage of trades “in the black”. Each result number can be used to test the reliability of the outcome (check for anomalies). At the end of the results there will be an option to view other results or run another simulation.

Other Results Page

This page will display all previously run simulations by all users and plot them on a graph with axes corresponding to the user selected variables. Datapoints will appear larger for greater volume of test results with the given parameters. Users can mouse over each datapoint to show the average result of simulations run at those parameters. Datapoints should show on a color scale from red to green based on performance.

Info Page

This page will show information about Bollinger Bands and what the user variables mean to the strategy. This page can be accessed at any point while visiting the app.

**Function**

Yfinance library in python will show stock history for a single stock symbol for 5 years. All trade signals and moving averages will be taken from the end of day prices, and the trading action will be taken from the beginning of day prices to simulate a casual day trader who makes decisions outside of trading hours.

A function will build the moving and compare to stock price, then if a signal is thrown, another function will log it as an action by the trader. Average returns after a sell signal will be calculated and added to the average return rate, weighted by how long the stock was held. All currently held stocks will be sold immediately when a sell signal is thrown.

Results will be tested for repeat and sent to a database that has a table for storing chart data. The average return will be added to the average return for that datapoint, volume will increase by one, and the color will be changed accordingly. The simulation will also be added to a table of completed simulations so repeats can be detected.

The chart of all results will be rendered using plotly as an interactive chart, so users can view results by hovering their cursor over the datapoint.