CSCI 654 Team Research Investigation
Network Investors - Stock Market Analytics

Team Member:
James Ferris
Zilong Li
Stock Movement Prediction with Historical Data

1. Stock Time Cycle.
2. EMA and SMA (Exponential and Simple Moving Average) Analysis.
4. Indicators
5. Chart Patterns
6. Sequential Programming
7. Parallel Programming
Daily Stock Time Series

1. Daily Stock Price Data including open, high, low, close, volume, covering up to 20 years of historical data.
2. Accumulate the daily stock price to discover the quarterly trends.
3. Measure the stock price in the same sector.
   a. Seasonal stock market trend for each year.
SMA based on the Daily Closing price (Simple Moving Average)

1. SMA is a widely used technical indicator that gives simple signals to investors.
2. SMAs are calculated sum of the consecutive prices over a period of a time
   a. $\text{SMA} = \frac{(\text{Day1} + \text{Day2} + \text{Day3} + \text{Day4})}{(\text{Number of Day})}$
3. Check the Price above/below SMA.
4. Calculate the long/short term SMA intersection point.
EMA based on the Daily Closing price (Exponential Moving Average)

1. EMAs is the 2nd most used indicator for stock charts.
2. EMAs value more on recent prices in short term and calculated by applying a periodical multiplier.
3. The formula for a 5 day EMA:
   a. EMA Percentage = 2 / (Number of Day + 1)
   b. (Close - EMA(last day)) * Percentage + EMA(last day)
4. Check the Price above/below EMA.
5. Calculate the long/short term EMA intersection point.
General Market Trend

1. Merge Market trends based on all companies’ result set.
2. Performance Ratio in different Time Frame.
Technical Indicators

1. Analyze technical indicators of each company
2. Indicators we will use:
   a. Relative Strength Index (RSI)
      i. Measures speed and change of price movement
      ii. $RSI = 100 - \left[\frac{100}{1 + \left(\frac{\text{Average of Upward Price Change}}{\text{Average of Downward Price Change}}\right)}\right]$ 
      iii. Determines if Overbought or Oversold
   b. Stochastic Oscillator
      i. Similar to RSI, but concerning closing prices
Chart Patterns

1. Different ways of looking at a chart to determine price action
2. Well-known patterns we will look for:
   a. Head and Shoulders
      i. Typically indicates a reversal either from bullish to bearish or vice versa
   b. Double Bottom
      i. Also indicates a reversal, however from bearish to bullish
Sequential Program

For each company
  Load in data
  Calculate EMA for multiple ranges
  Calculate SMA for multiple ranges
  Calculate RSI
  Calculate Stochastic Oscillator
  Search for Chart Patterns
  Determine general rating based on average of above calculations
Parallel Program

Parallel For each company
  Load in data
  Calculate EMA for multiple ranges
  Calculate SMA for multiple ranges
  Calculate RSI
  Calculate Stochastic Oscillator
  Search for Chart Patterns
  Determine general rating based on average of above calculations
Questions?