Algorithmic Trading

FinTech

Lesson 15.1

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Intro to Algorithmic Trading

Intro to Algorithmic Trading

A typical day for traders involves:

- Tracking the transactional history of many stocks
- Identify the best opportunity to buy, sell, and hold
- Maintain knowledge about the highs and lows for each individual stock, as well as their overall portfolio value and profit/loss
- Keeping emotions in check

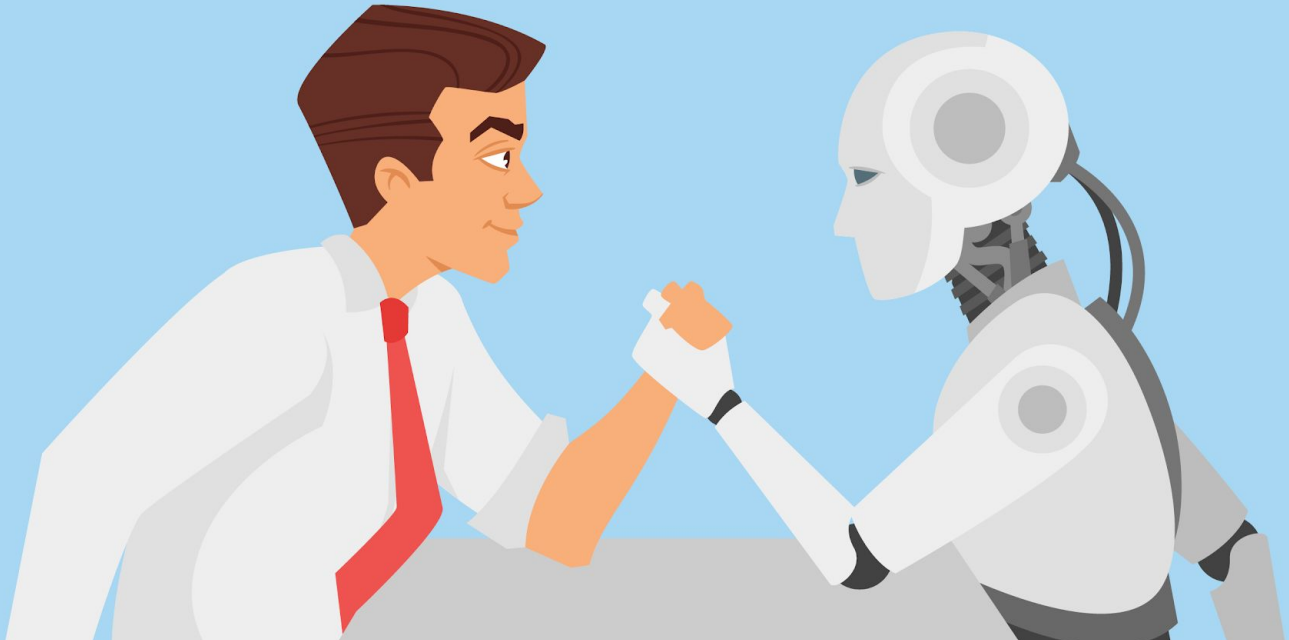
Intro to Algorithmic Trading

The sheer number of moving parts and details that need to be considered can make it difficult for the human mind to consistently make performant trades.

This is where **algorithmic trading** comes in.

Intro to Algorithmic Trading

The key difference between human traders and algorithmic trading is that computers can make decisions and predictions much more efficiently and effectively than humans, and they can do so without human emotions getting in the way.



Intro to Algorithmic Trading

It's common for FinTech firms to use algorithms to make trading decisions across all domains. This applies to trading in stocks, bonds, options, currencies (money transfer), carbon credits, mortgages, or even consumer loans.

What Is Algorithmic Trading?

Intro to Algorithmic Trading

Algo trading is the use of models to make trading decisions.

C

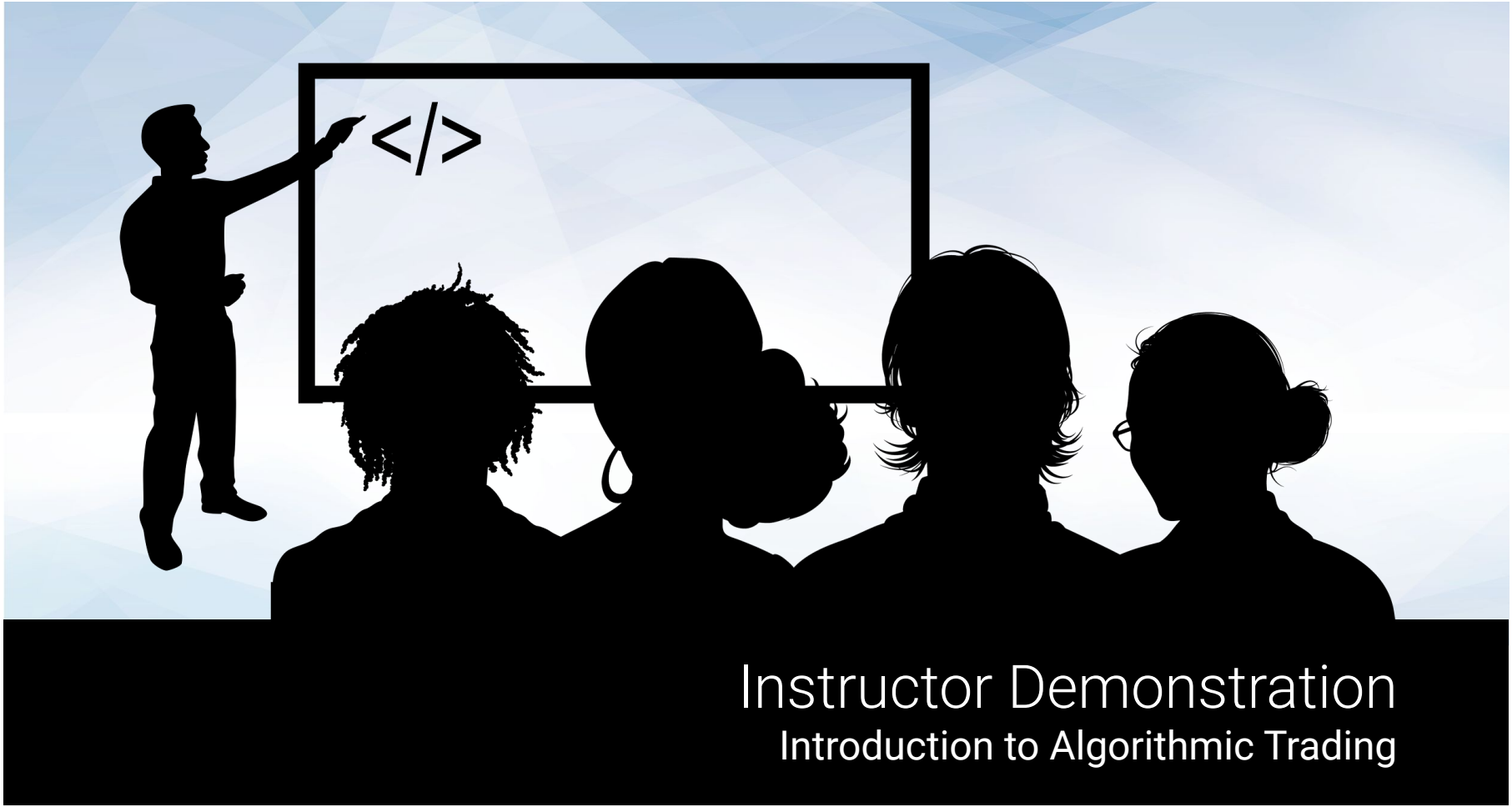
Intro to Algorithmic Trading

Algorithmic trading is simply using code to decide and execute a trade (buy/sell).

For example

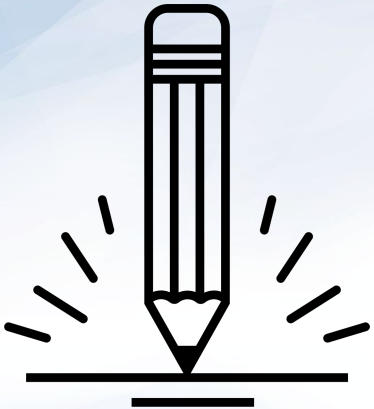
A simple algorithm could be to sell 100 shares of a stock when the intraday percentage return of a stock falls below -3%.

```
# A pseudocode snippet for preventing further intraday loss of a stock
# by selling a stock when the intraday return falls below -3%. There is
# an assumption that a StockMarket account has 100 shares of MU.

# Initialize StockMarket account object
account = StockMarket()

# Set stock ticker and share size
stock = “MU”
shares = 100

# Continuous loop that checks intraday return of a particular stock
while True:
    # Check intraday return
    intraday_return = account.get_intraday_return(stock)

    # If intraday percentage return falls below -3%, sell the stock and shares
    if intraday_return < -0.03:
        account.sell(shares, stock)
```



Instructor Demonstration

Introduction to Algorithmic Trading



Activity: Getting Started with Algorithmic Trading

In this activity, students will write a trading algorithm that uses Python to represent the conditions of a simple trading strategy.

Suggested Time:
15 Minutes

Time’s Up! Let’s Review.

Assessing Trading Algorithms

Assessing Trading Algorithms

Now that we built a simple trading algorithm, it's time to calculate the profit that a trading algorithm generates—valuable information for most investors!

Assessing Trading Algorithms

For this profit-calculation demonstration, we'll slightly adjust the trading strategy of our algorithm.

1. We'll change the code so that it only buys (and doesn't sell) shares during the trading period.
2. Then, it will sell all the shares on the final day of the period.

Cost and Proceeds

Costs and Proceeds

Calculating costs and proceeds:

1

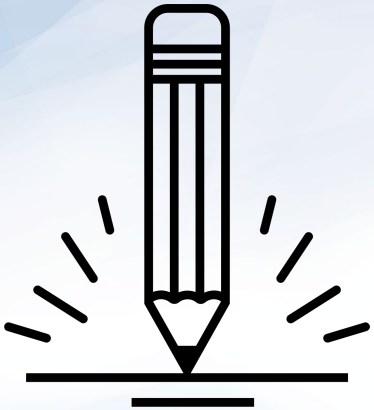
We calculate the cost of each trade by multiplying the closing price of the stock by the number of shares that we bought.

2

We calculate the proceeds by multiplying the closing price of the stock by the total number of shares that we accumulated over the period.

3

Finally, we calculate the profit or loss by subtracting the total cost of the shares that we bought from the total proceeds that we made from selling the shares.



Activity: Profitable Algorithmic Trading

In this activity, you'll write a trading algorithm that buys 100 shares of AMD stock on the days when the price decreases and that sells the accumulated shares on the last day of the trading period.

Suggested Time:
15 Minutes

Time’s Up! Let’s Review.

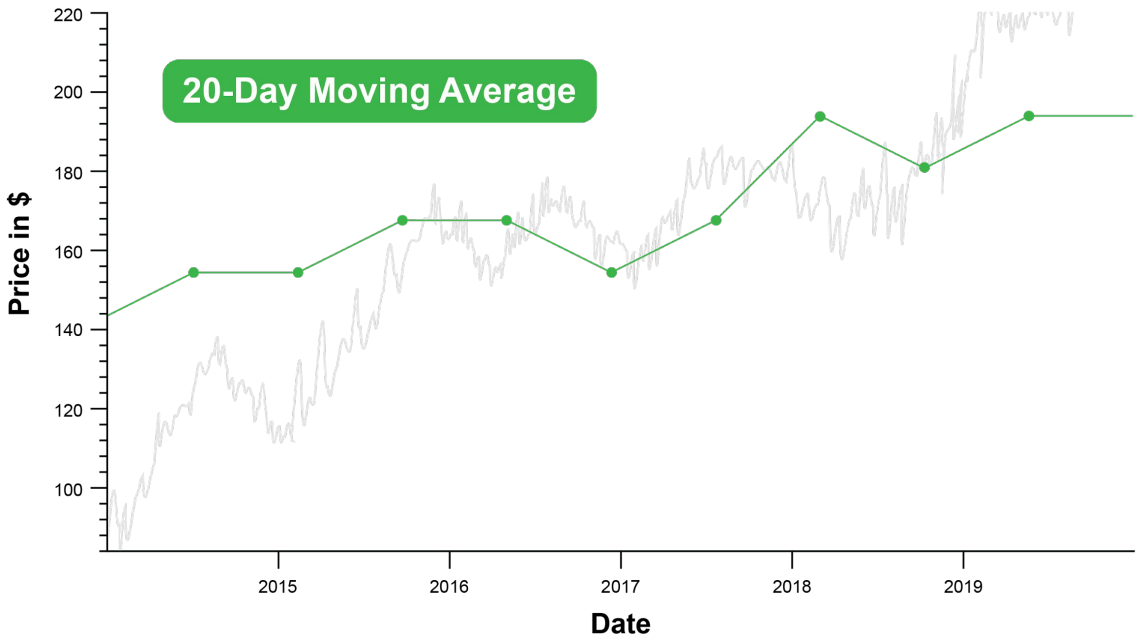

Break

Trading Signals

Trading Signals

- Trading signals are point-in-time indications of when to buy a stock (enter a trade) or sell the stock (exit a trade).

- To make intelligent trades, we therefore need to form trading signals that can identify underlying price trends and thus refine our trade entry and exit strategies.



Trading Signals

Fundamental analysis focuses on the long-term health of a company. This includes its historical cash flow, debt-to-equity ratio, and management quality.

01

Financial Documents

02

Press Releases

03

Analysis and Trends

Trading Signals

Technical analysis focuses on the price action of a company's stock. Because technical analysis is quantitative in nature, algorithmic trading often leans toward this philosophy when determining when to buy or sell.

01

Charts

02

Technical Indicators

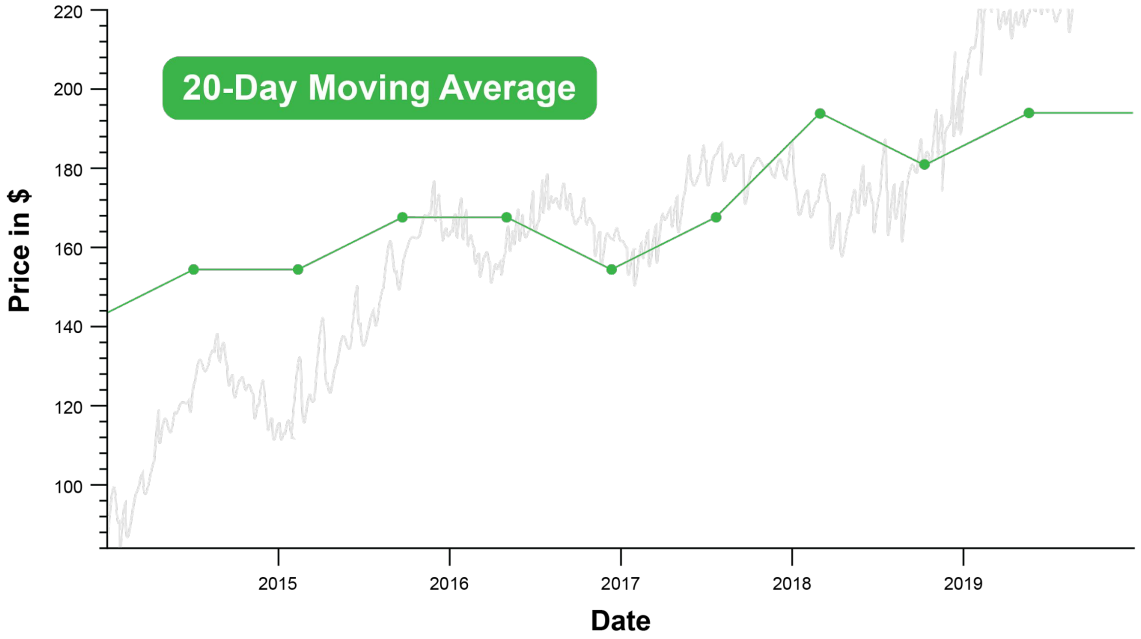
03

Trends

Trading Signals

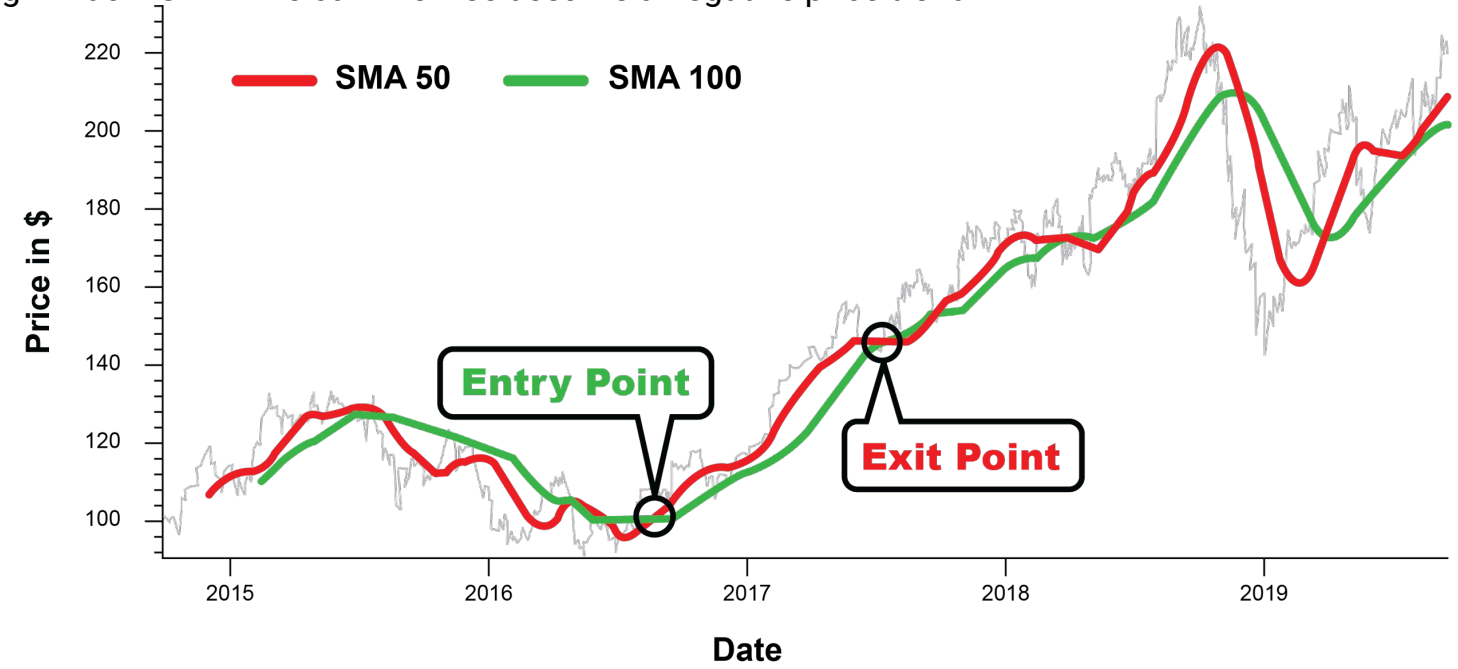
Simple Moving Average (SMA)

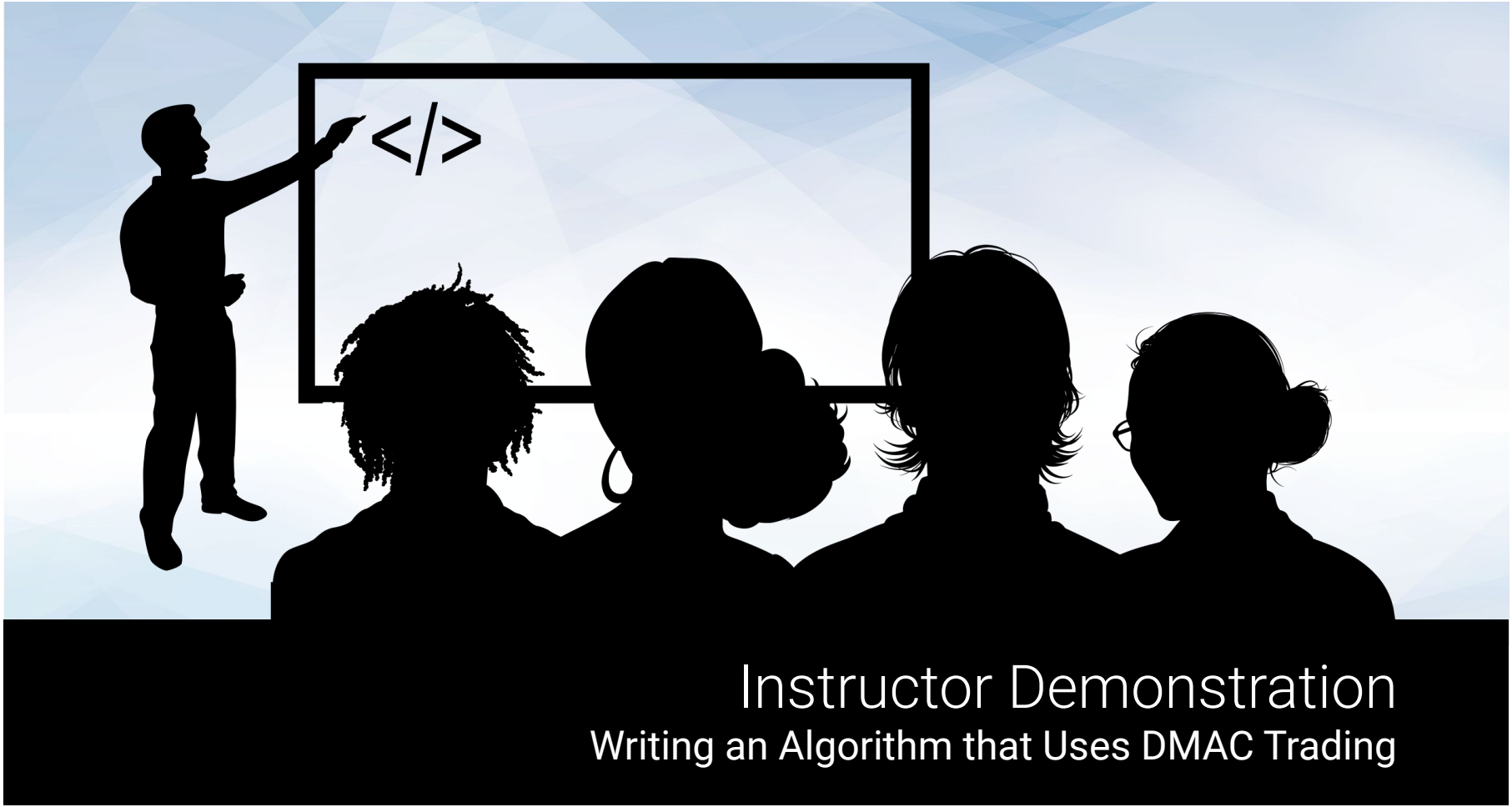
- The SMA calculates the average price of a stock over a rolling period of a specific number of days.
- When trading, we can consider using both a long-window SMA (say, for 100 or 200 days) and a short-window SMA (say, for 30 or 50 days).



Trading Signals

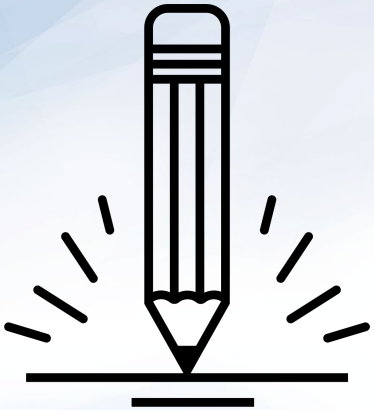
When trading, we can consider using both a long-window SMA (say, for 100 or 200 days) and a short-window SMA (say, for 30 or 50 days). When the short-window SMA is greater than the long-window SMA, we can assume that the price trend is positive over the short term. When the opposite is true—when the short-window SMA is less than the long-window SMA—we can likewise assume a negative price trend.





Instructor Demonstration

Writing an Algorithm that Uses DMAC Trading



Activity: Create a Short-Position Algorithm

In this activity, students will create an algorithm to identify the entry and exit points for a short-position trading strategy. The algorithm will still use a short-window (50 days) SMA and a long-window (100 days) SMA.

Suggested Time:
15 Minutes

Time’s Up! Let’s Review.

Questions?


The End