Automated Stock Trading Agent

IDS 705 Final Project

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The Problem

The Stock Market can be unpredictable

What's Wrong with Human Intuition?

Let's Try Automated Trading!

- Algorithms have many advantages over human traders.
- Automated trading is a completely passive form of earning money.
- Algorithms are detached from emotions.

Our Solution: A Stock Trading Agent

Stock Trading Agent

- **Goal**: Maximize return of investment over time.
- Interacts with the stock market to make buy or sell **decisions**.
- Buy-sell decisions are made based on different sets of **strategies**.

Strategies we implemented

Indicators	Time Series	Reinforcement Learning
SMA MACD RSI ADX	ARIMA LSTM	Deep Q-network Natural evolution strategy

The Flow of An Agent

Begin with Initial Investment ($1000)

Step 1

Step 2

Check Strategy - Buy, Sell, or Hold?

Check Wallet Balance - Can I Buy or Sell?

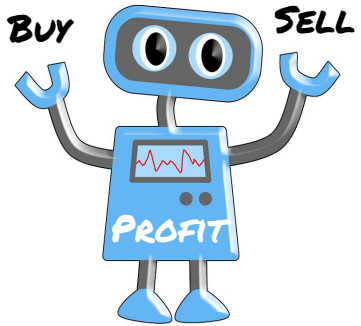
Step 3

Step 4

Buy, Sell, or Hold

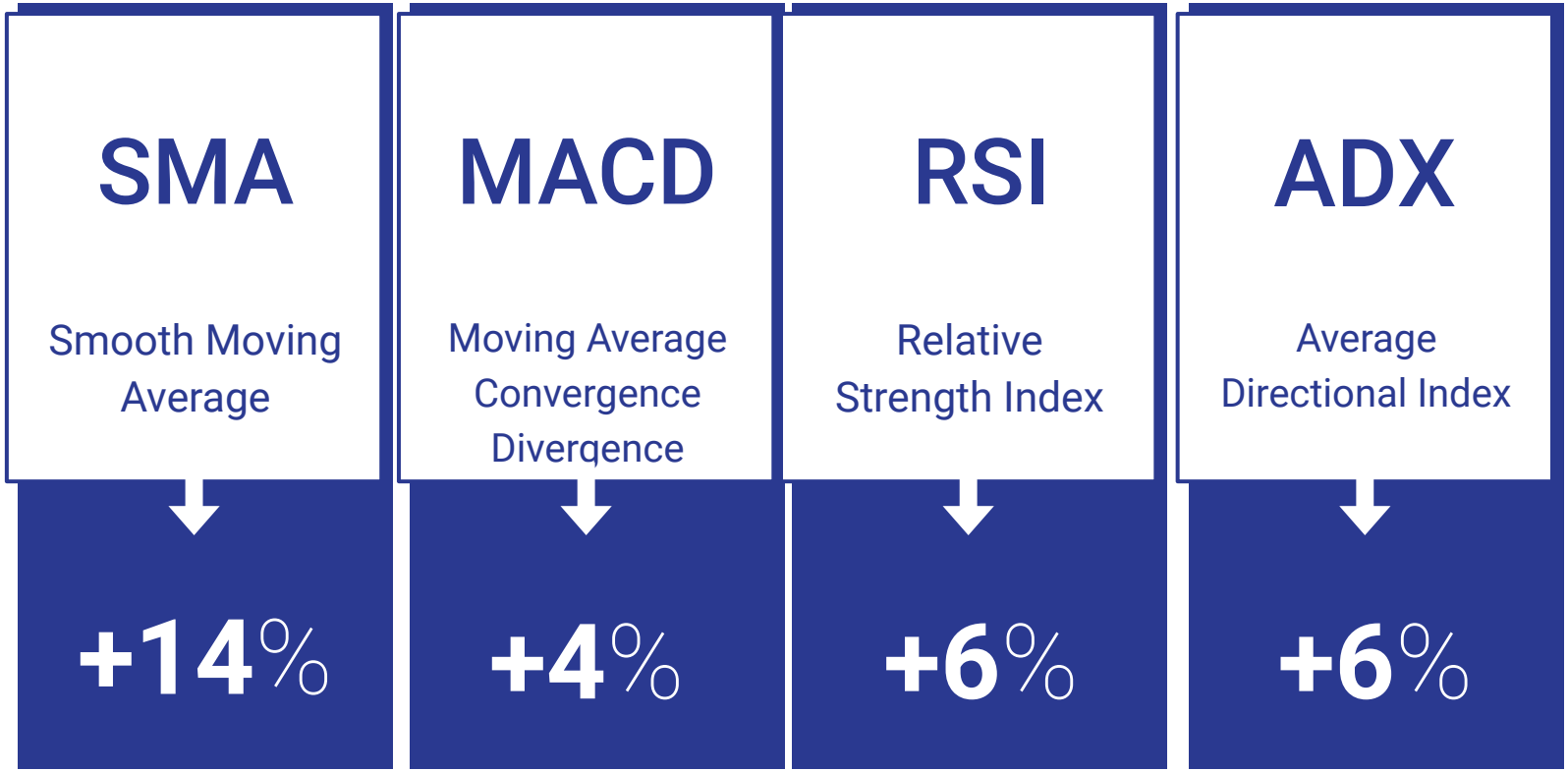
End - How Much Did We Grow our Investment?

Step 5



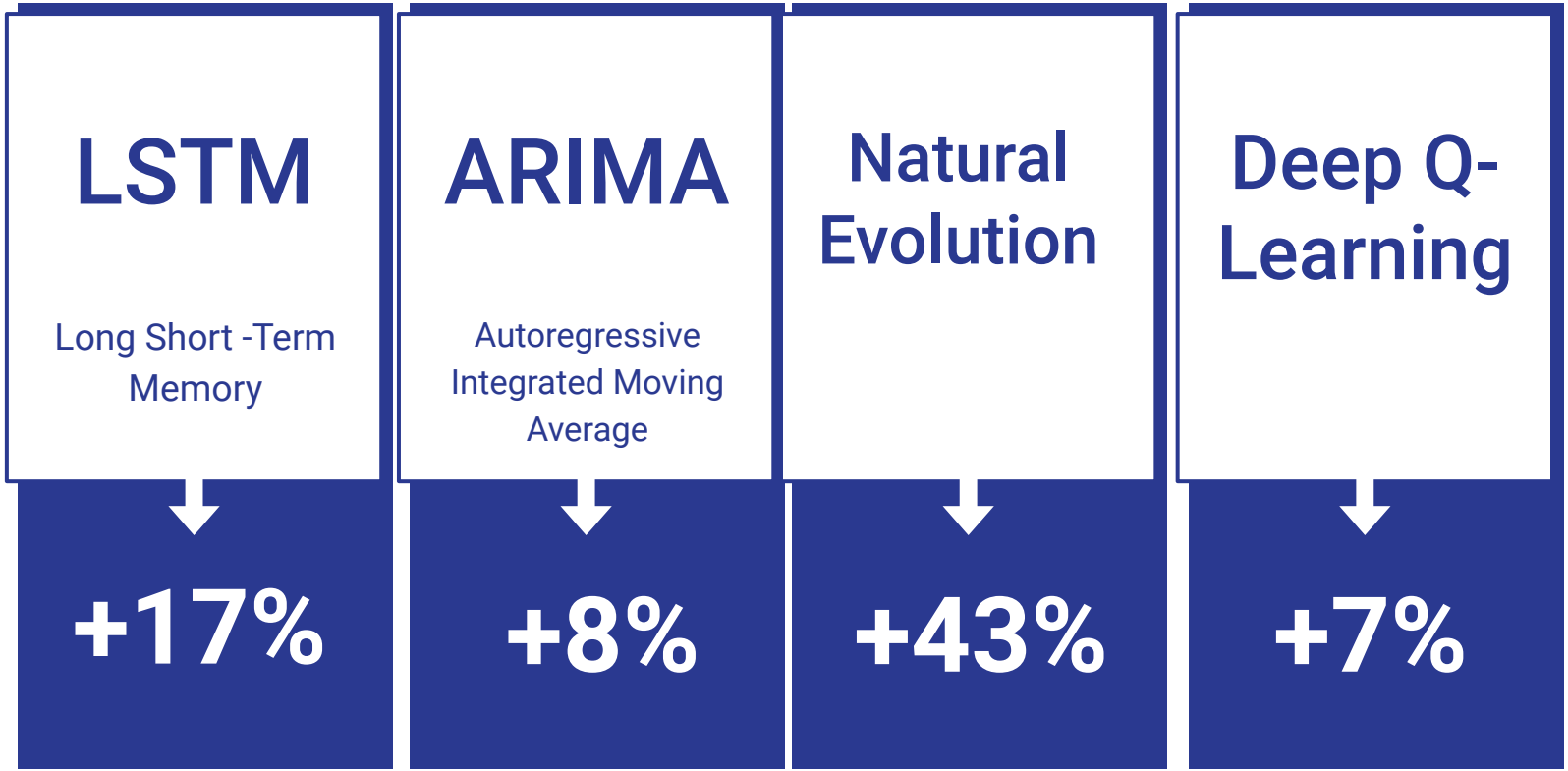
Performance: Technical Indicators Agents

S&P 500 | 8/7/20 - 4/16/21 | Baseline ROI: 24 %



Performance: Machine Learning Agents

S&P 500 | 8/7/20 - 4/16/21 | Baseline ROI: 24 %



Decision Plots

Buy-sell Decision Plots on Test Dataset for Natural Evolution

Performance Rankings

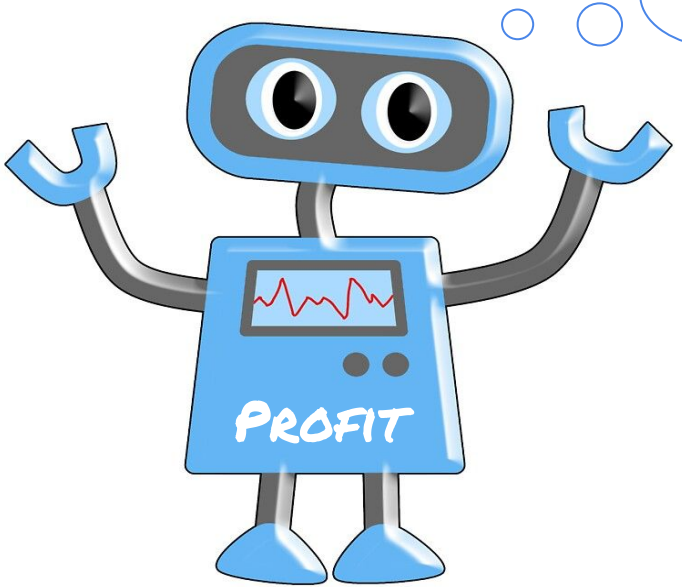
1. **Natural Evolution: + 43%**
2. **LSTM: + 17%**
3. SMA: + 14%
4. **ARIMA: + 8%**
5. **Deep Q-Learning : + 7%**
6. ADX: + 6%
7. RSI: + 6%
8. MACD: + 4%

Baseline : +24 %

Conclusions

- 4 indicator agents, 4 ML agents
- Stock Market Is Highly Volatile
- Far from perfect

Future Directions

1. Model stacking: combine different strategies based on different market situation
2. Include more inputs other than opening prices: volume, indicators etc.
3. RL: Stability issue not yet solved

Thank You !