# Al Trading Platform

Adrian, Gabe, Yagiz, and Odi

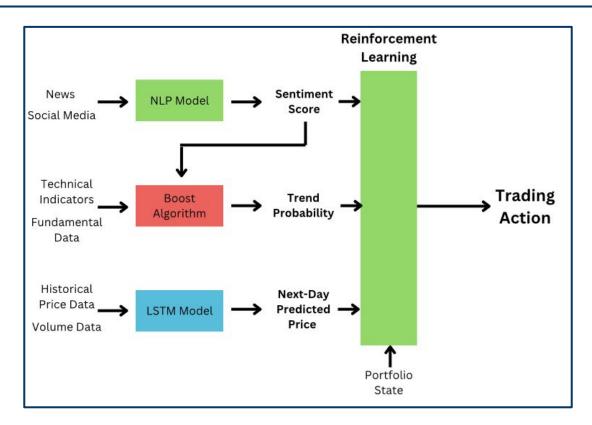
#### **Problem Statement**

Investors often **struggle** with **predicting stock price** movements, generating timely trading signals, and optimizing portfolio management, resulting in **suboptimal returns**. We aim to solve this by developing an **automated**, machine learning-based **equity trading system** that simplifies decision-making, accurately forecasts market trends, generates actionable buy/sell signals, and optimizes portfolio management to **maximize returns**.

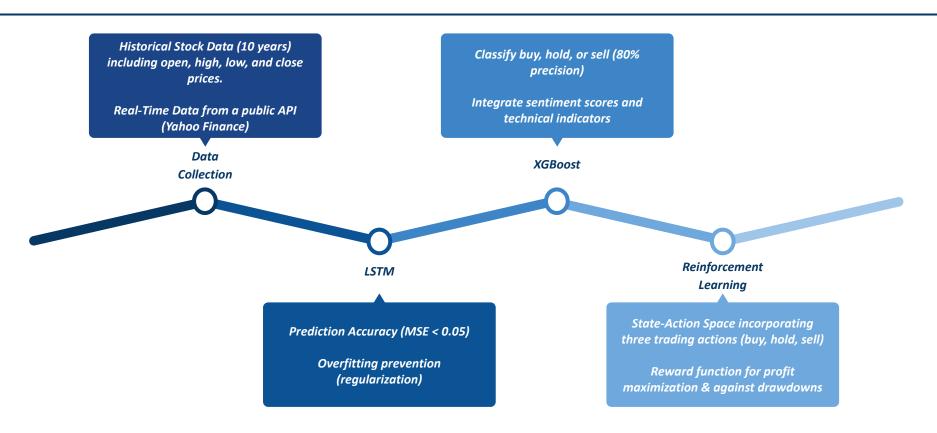
#### **Deliverables**

- ★ Working Prototype: A fully functional **algorithmic trading system**
- ★ Advanced software trading algorithms utilizing:
  - Long Short-Term Memory (LSTM) networks
  - XGBoost
  - Sentiment Analysis using Natural Language Processing
  - Reinforcement Learning
- ★ Intermediate Deliverables:
  - Historical market data analysis reports
  - Trading strategies
  - Web Application

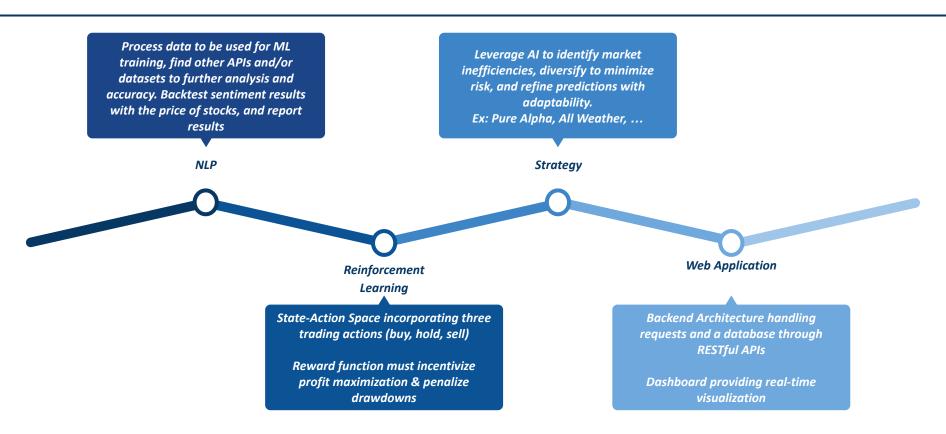
### AI Trading Model Architecture



# Requirements Fulfilled



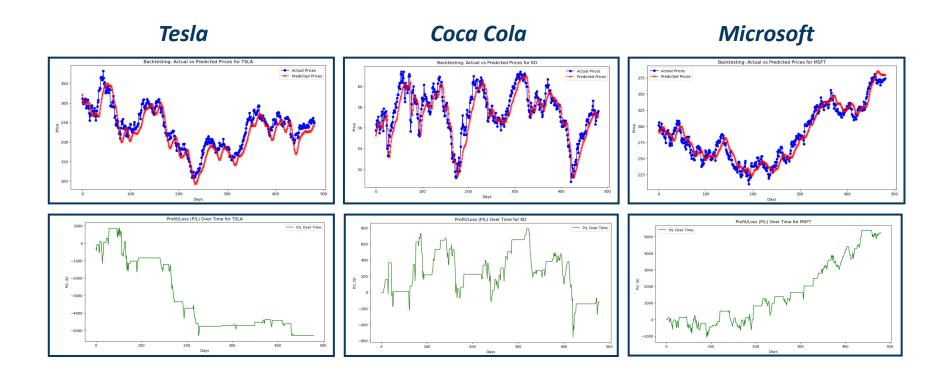
# Requirements Left



### **Prototype**

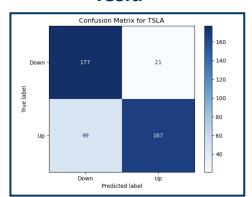
Tesla (TSLA), Coca Cola (KO), and Microsoft (MSFT) Collected price data of selected stocks through yahoo finance Added technical and fundamental indicators Includes ROE, Moving Averages, Stochastic Oscillator, Bollinger Bands, Sharpe Ratio, ... as input to models Trained and Tested LSTM and XGBoost on LSTM criterias: MAE, RMSE, MAPE, P/L, ... XGBoost criterias: Confusion Matrix, P/L, ... those stocks Backtested the 3 selected stocks over more **Backtested LSTM and XGBoost** than 500 days and compared models results

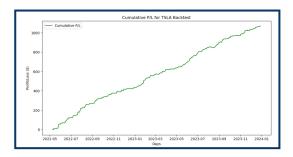
# **LSTM Backtesting Results**



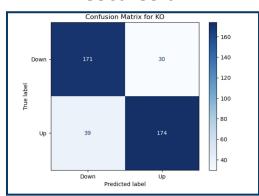
### XGBoost Backtesting Results

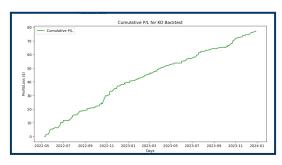
Tesla



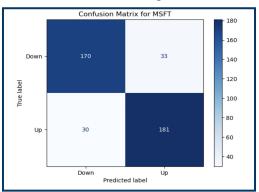


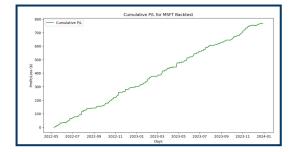
#### Coca Cola





#### Microsoft





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					1316	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	3	10
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Senior Design Project	start	end	239h	22%			Т																_							_
Research	09/16/24	09/25/24	25h	100%																										
Perform research on stock data APIs Perform whole model research (ML	09/16 09/16	09/20 09/20	5	100% 100%																										
Perform research on fundamental a	09/16	09/25	12	100%																										
LSTM Model Research	09/23/24 09/23/24	10/07/24 09/25/24	23h 5h	100%				_																						
Read about past implementations	09/23/24	09/25/24	5 S	100%																										
Initial Implementation	09/25/24	10/03/24	10h	100%			_																							
Implement stacked version	09/25	09/27	4	100%																										
Implement research obtained (At	09/30	10/03	6	100%																										
Tuning and Optimization	10/03/24	10/07/24	8h 5	100%				_																						
Hyperparameter Tuning for Attent Complete optimization	10/03 10/04	10/04	3	100% 100%			-																							
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XGBoost Model Research	10/07/24	10/25/24	24h 5h	100%							1																			
Perform research on XGBoost Mo	10/07/24	10/09/24	5	100%																										
Implement Model	10/16/24	10/25/24	19h	100%					_																					
Implement genetic algorithm	10/16	10/18	7	100%																										
Implement XGBoost Model	10/21	10/25	12	100%																										
First Prototype Testing	11/04/24	11/07/24	16h	100%																										
Train and Obtain Results	11/04/24	11/07/24	16h	100%																										
Train all models on 3 stocks	11/04	11/06	8	100%																										
Provide relevant results	11/05	11/07	8	100%																										
Reinforcement Learning Model	11/11/24	12/13/24	22h	39%											0,0			7												
Research	11/11/24	11/13/24	4h 4	100%																										
Perform research on RL models Implement Initial Model	11/11 11/20/24	11/13 11/22/24	4 8h	100% 70%										_	_															
Implement PPO RL model	11/20	11/22	8	70%																										
Fix and Fine Tune Model	12/02/24	12/13/24	10h	9%											7	-		-												
Perform more research on model	12/02	12/05	3	20%													1													
Fix action space	12/09	12/13	7	0%																										
Sentiment Analysis	11/26/24	02/14/25	41h	0%													_		-	-		_		_		_	7			
Process data from 1st Semester to	11/26	01/21	10	0%													_	_												
Train the model on stocks	01/21	02/14	12	0%																							7			
Find other APIs, or data to be used Provide Results	01/02	02/14	12 7	0%																						1				
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Trading Strategy Research known Strategies	01/20/25 01/20	02/28/25 01/31	12h 4	0% 0%																									T <sup>*</sup>	
Develop own Strategy	02/03	02/21	5	0%																								-		
Test Stretagy	02/24	02/28	3	0%																									-	
Web Application	01/03/25	01/31/25	31h	0%																										
Complete Design	01/03/25	01/09/25	4h	0%																					11					
Sketch design of web app	01/03	01/09	4	0%																		1								
Develop Backend	01/07/25	01/21/25	13h	0%																		-								
Package ML models	01/07	01/09 01/21	3 10	0% 0%																										
Create API endpoints  Develop Frontend	01/08	01/21	10 14h	0%																										
Integrate API endpoints with fron	01/21	01/22	2	0%																										
Make the web app easy to use	01/22	01/31	12	0%																										
Final Testing	02/03/25	03/10/25	45h	0%																							4			
Perform extensive backtesting	02/03	02/12	10	0%																										1.
Perform testing on real-time data	02/13	02/19	20	0%																										
Optimize and tune based on results	02/20	03/10	15	0%																								_		-

#### **Conclusion**

- ★ Developed and fully tested LSTM & XGBoost models
  - Sufficient results
- ★ Finishing development of NLP & Reinforcement Learning Model
  - Test results of both
- ★ Begin development of web application
  - Finish development hosted in the cloud
  - Fully test web application while developing
- ★ Design trading strategy
  - Evaluate strategy with backtesting and live simulation trading
- ★ Compare full trading results against firms