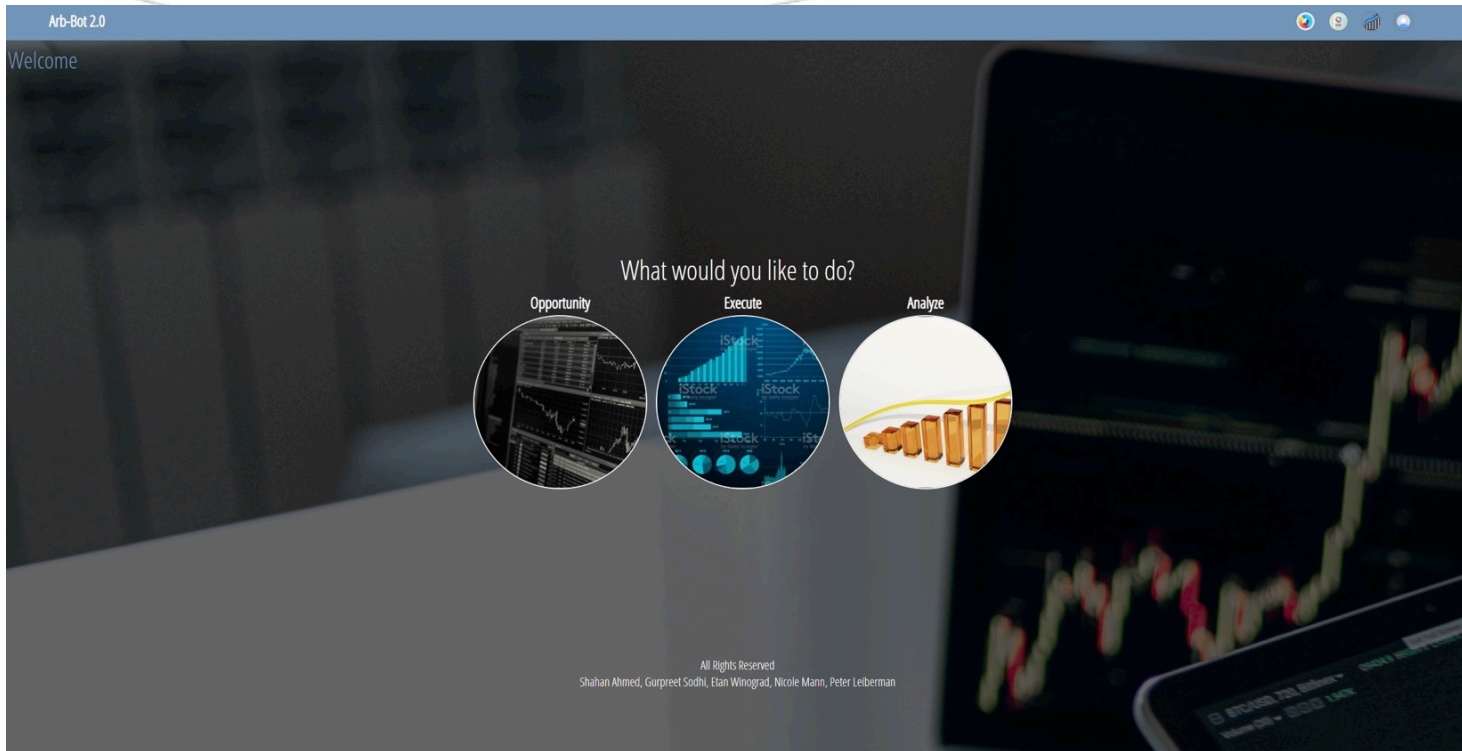


# Arb-bot 2.0

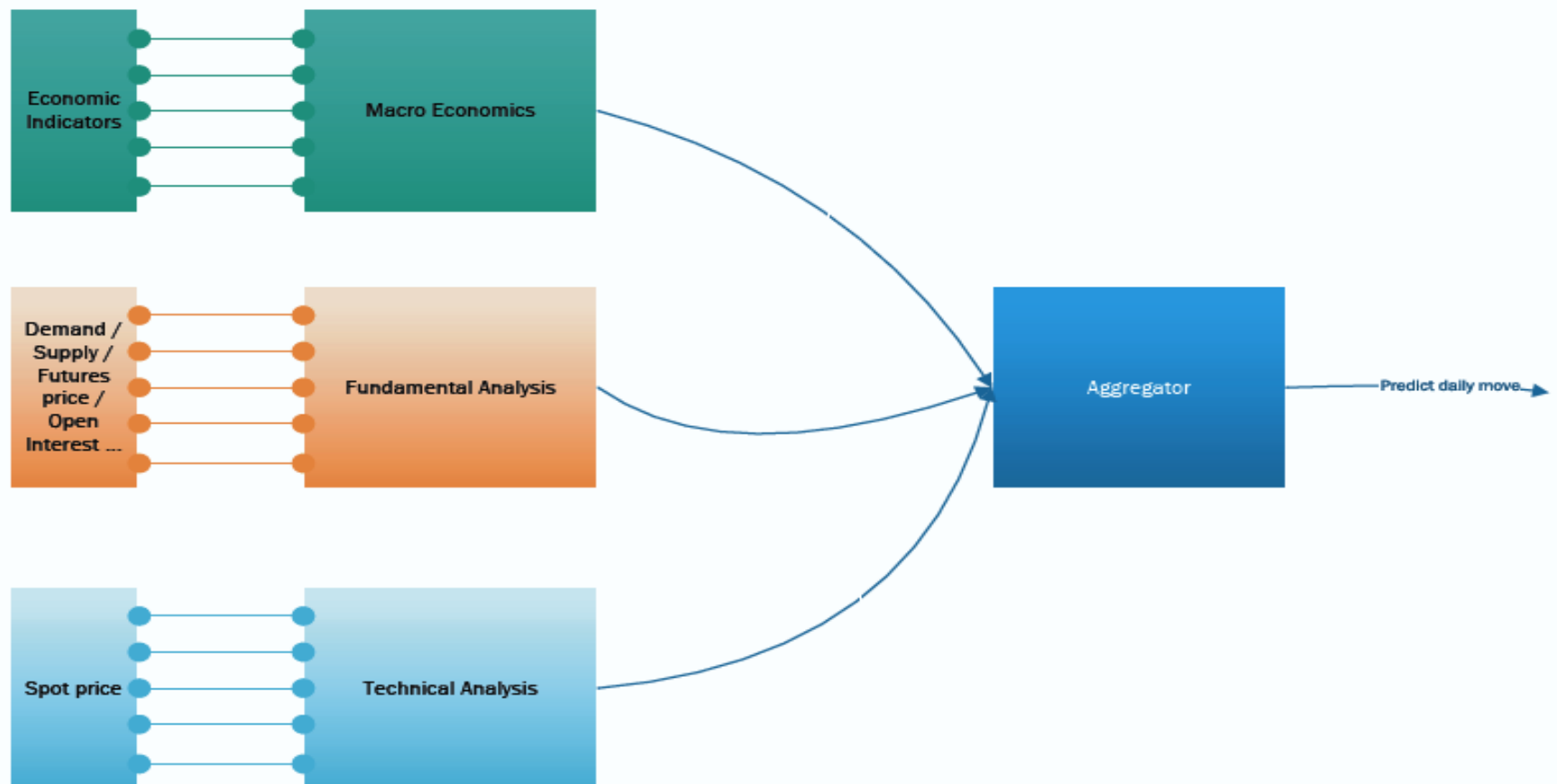
## Algo Trading



**Team #4 – Project 2**

**Gurpreet Sodhi, Shahan Ahmed, Nicole Mann, Etan Winograd, Peter Leiberman**

# Logic Flow



# Technology Breakdown

- Python – ML libraries, data processing , and calculations.
- HTML – Markup language used for graphical Interface.
- JavaScript – Processes the user interactions.
- PHP – Server side communication.



# Data Preparation

- ◆ 10 years of crude and gold price data (spot and future) from Bloomberg terminal.
- ◆ 10 years of economic data from Bloomberg.
- ◆ Convert data for appropriate machine learning models.
- ◆ Enhance data by creating square terms, cross terms, and filling in missing data.





# Demonstration

Arb-Bot 2.0

Market Analysis (crude)

close panel

Fundamental Analysis

Model: All

Offset: 7

Execute

Technical Analysis

Model: All

SMA5 Fast: 4

SMA Slow: 100

EMA: 50

Volatility Window: 4

Execute

Macro Analysis

Model: All

Execute

Fine-Tune Analysis

Output

Input

Model

Offset

Execute

Model

Offset

Execute

Arb-Bot 2.0

Welcome

What would you like to do?

Opportunity

Execute

Analyze

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Shahin Mirzaei, Gaurang Sathya, Ivan Whigge, Nicole Mann, Peter Lieberman

Arb-Bot 2.0

Market Analysis (crude)

Reports - Fundamental

Logistic Regression model

	-1	1	accuracy	macro avg	weighted avg
precision	0.431138	0.551938	0.527094	0.489158	0.498232
recall	0.199446	0.789357	0.527094	0.494401	0.527094
f1-score	0.272727	0.648635	0.527094	0.461181	0.482069
support	361.000000	451.000000	0.527094	812.000000	812.000000

SVM Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.428167	0.561497	0.529557	0.509832	0.513559
recall	0.318560	0.698448	0.529557	0.508504	0.529557
f1-score	0.375817	0.625630	0.529557	0.499173	0.513846
support	361.000000	451.000000	0.529557	812.000000	812.000000

RandomForestClassifier Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.438806	0.551363	0.504936	0.495884	0.501322
recall	0.407202	0.583149	0.504936	0.495175	0.504936
f1-score	0.421414	0.566810	0.504936	0.494612	0.502614
support	361.000000	451.000000	0.504936	812.000000	812.000000

Decision Tree Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.479751	0.578411	0.539409	0.529681	0.534549
recall	0.426593	0.629712	0.539409	0.528152	0.539409
f1-score	0.451613	0.602977	0.539409	0.527293	0.536681
support	361.000000	451.000000	0.539409	812.000000	812.000000

GaussianNB Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.434009	0.541787	0.480296	0.488898	0.494048
recall	0.559557	0.411851	0.480296	0.488284	0.488296
f1-score	0.489104	0.471178	0.480296	0.480141	0.479148
support	361.000000	451.000000	0.480296	812.000000	812.000000

Spot Price (Fundamental)

Aggregate Volume (Fundamental)

Arb-Bot 2.0

Market Analysis (crude)

trima (Technical)

sma\_fast (Technical)

Reports - MACRO

Logistic Regression model

	-1	1	accuracy	macro avg	weighted avg
precision	0.530000	0.593968	0.567097	0.546984	0.555168
recall	0.088542	0.937729	0.567097	0.519135	0.567097
f1-score	0.150442	0.722723	0.567097	0.438858	0.488998
support	192.000000	773.000000	0.567097	465.000000	465.000000

SVM Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.583333	0.591611	0.581398	0.587072	0.588193
recall	0.034458	0.981085	0.581398	0.509072	0.581398
f1-score	0.068627	0.738292	0.581398	0.403460	0.481195
support	192.000000	773.000000	0.581398	465.000000	465.000000

RandomForestClassifier Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.583333	0.591611	0.581398	0.587072	0.588193
recall	0.034458	0.981085	0.581398	0.509072	0.581398
f1-score	0.068627	0.738292	0.581398	0.403460	0.481195
support	192.000000	773.000000	0.581398	465.000000	465.000000

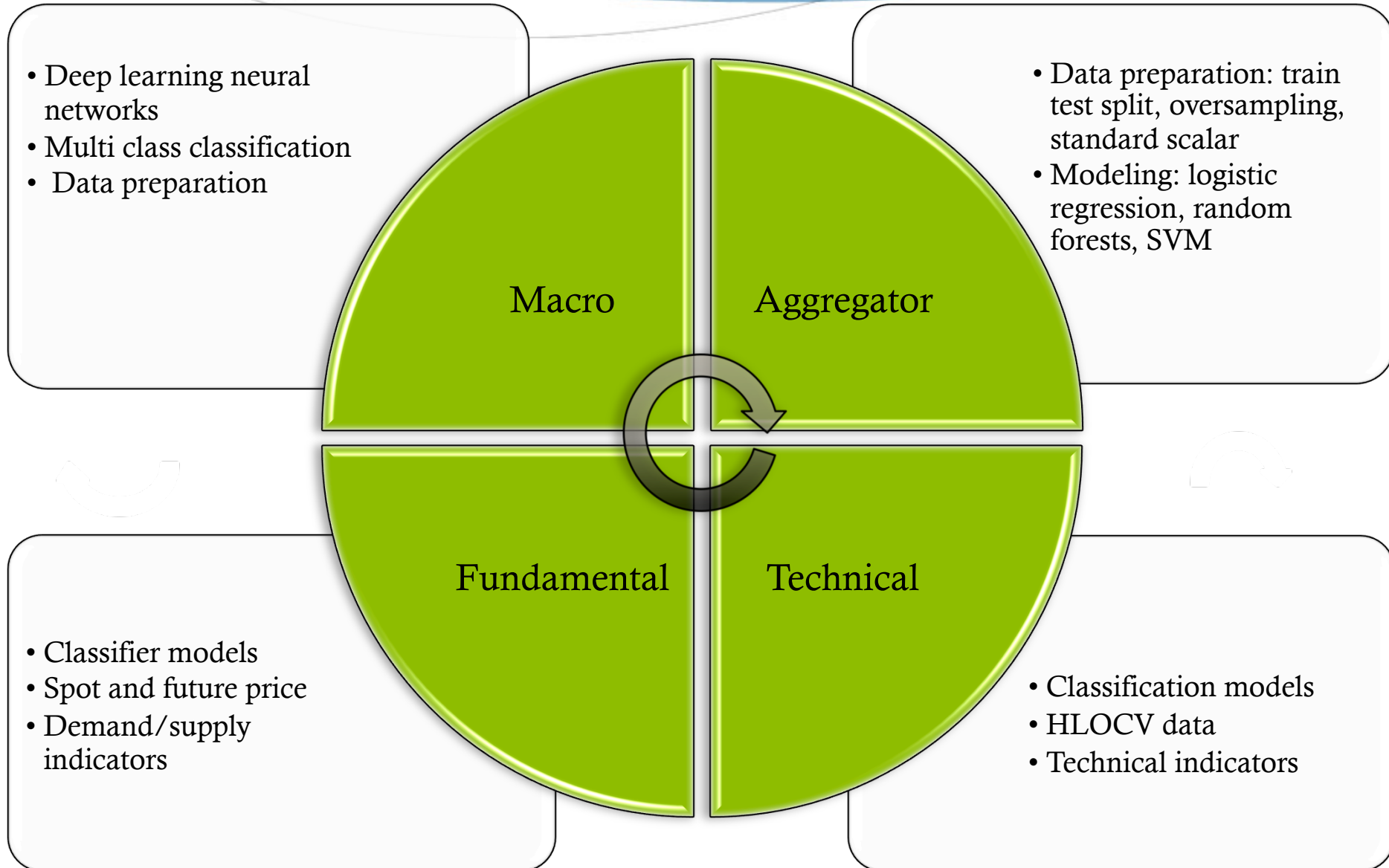
Decision Tree Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.456716	0.619848	0.530403	0.529132	0.544794
recall	0.583333	0.476190	0.530403	0.529162	0.530403
f1-score	0.581119	0.538882	0.530403	0.519710	0.522949
support	192.000000	773.000000	0.530403	465.000000	465.000000

GaussianNB Classifier

	-1	1	accuracy	macro avg	weighted avg
precision	0.400000	0.561290	0.453763	0.489445	0.494193
recall	0.045833	0.938881	0.453763	0.4802257	0.453763
f1-score	0.094024	0.409542	0.453763	0.450283	0.442664
support	192.000000	773.000000	0.453763	465.000000	465.000000

# Arb-Bot 2.0 Core Models



# Future Enhancements

Predict the future, NOW!

- ◆ Horizontal enhancement – more asset coverage.
- ◆ Vertical enhancement
  - ◆ Data optimization
  - ◆ Fine-tune ML models



# Conclusion

Aggregate is better than the sum of individuals

- 💧 We brought together three streams of finance (Macro, Fundamental, Technical) on the same platform.
- 💧 Each stream leveraged the best possible ML model.





# Appendix

- 💧 Gurpreet – Fundamental analysis
- 💧 Peter – Aggregate analysis
- 💧 Nicole – Macro analysis
- 💧 Etan – Technical analysis
- 💧 Shahan – Code integration & front end

GitHub link - [https://github.com/gurpreetsodhi/Columbia\\_Fintech\\_Project2](https://github.com/gurpreetsodhi/Columbia_Fintech_Project2)