Wall Street Analytics Challenge '24

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Milestone 1
Future Stock price prediction, Visualisation, and Insights

PAT Predictions

PAT based on Revenue:

	STOCK_TICKER	PAT	PAT_revenue
0	ZENTEC	130	380.301555
1	TITAN	3496	5607.782224
2	PGEL	135	206.881790
3	KILBURN	40	89.168932
4	HAL	6600	8160.991115
5	BRITANNIA	2134	2573.736428

PAT based on Margin:

	STOCK_TICKER	PAT	PAT_margin
0	ZENTEC	130	107.518792
1	TITAN	3496	4350.998356
2	PGEL	135	219.605534
3	KILBURN	40	40.000000
4	HAL	6600	7349.293892
5	BRITANNIA	2134	2269.478583

PAT based on Capex:

	STOCK_TICKER	PAT	PAT_capex
0	ZENTEC	130	130.000000
1	TITAN	3496	4686.045778
2	PGEL	135	244.377207
3	KILBURN	40	59.289122
4	HAL	6600	10668.771688
5	BRITANNIA	2134	2134.000000

Merged Data

	STOCK_TICKER	COMPANY NAME	REVENUE_current	EBITA_MARGIN_current \
0	ZENTEC	Zen Technologies	440	41
1	TITAN	Titan	51084	10
2	PGEL	PG Electroplast	2746	10
3	KILBURN	Kilburn Engineering	293	22
4	HAL	Hindustan Aeronautics	30381	32
5	BRITANNIA	Britannia Industries	16769	19

	CAPEX_current	PAT	FAIR STOCK_PRICE	REVENUE_forecasted
0	93	130	820	900
1	3709	3496	2800	70000
2	783	135	310	3650
3	100	40	400	500
4	7950	6600	3400	35000
5	2890	2134	4600	19000

	EBITA_MARGIN_forecasted	CAPEX_additional	PAT_revenue	PAT_margin \
0	35	NaN	380.301555	107.518792
1	12	800.0	5607.782224	4350.998356
2	15	380.0	206.881790	219.605534
3	22	30.0	89.168932	40.000000
4	35	3000.0	8160.991115	7349.293892
5	20	NaN	2573.736428	2269.478583

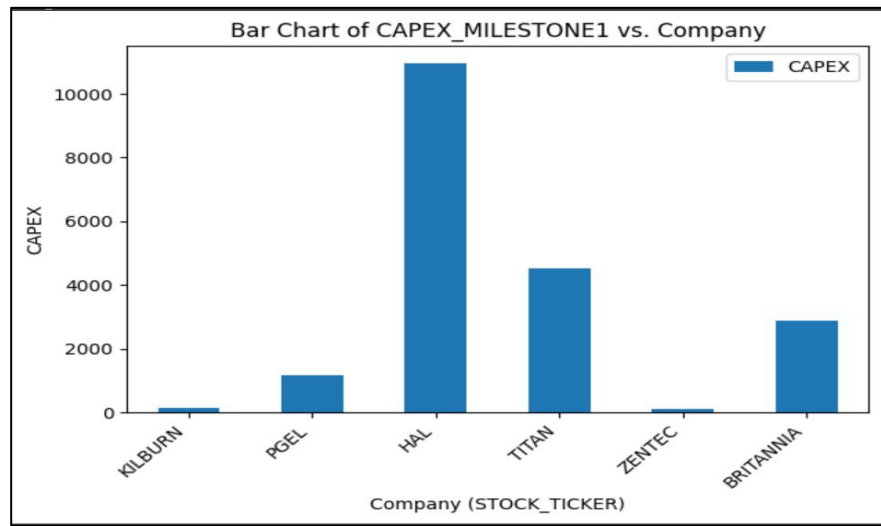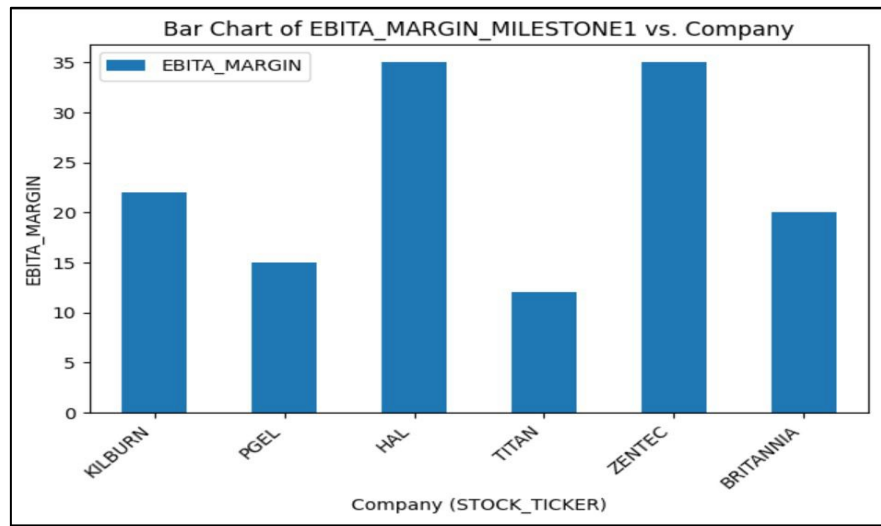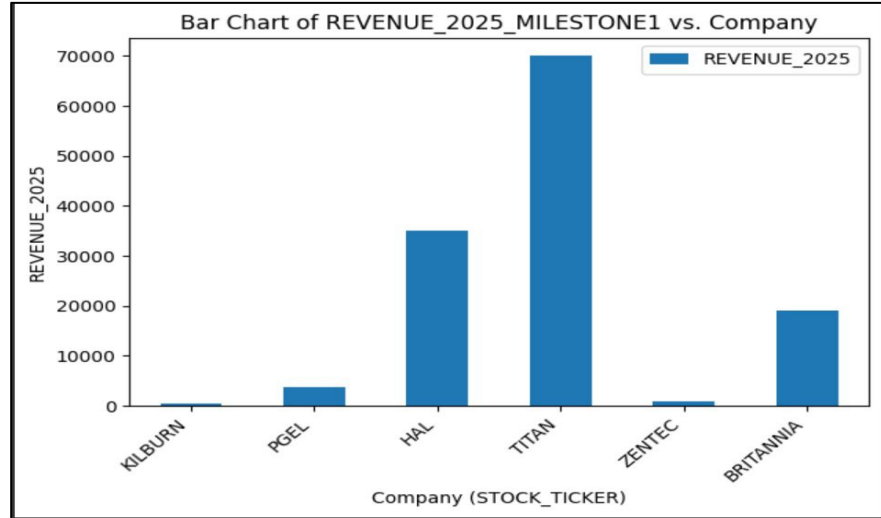|	CAPEX_forecasted_total	PAT_capex	PAT_avg	PAT_Growth_%
0	93.0	130.000000	205.940116	58.415474
1	4509.0	4686.045778	4881.608786	39.634119
2	1163.0	244.377207	223.621510	65.645563
3	130.0	59.289122	62.819352	57.048379
4	10950.0	10668.771688	8726.352232	32.217458
5	2890.0	2134.000000	2325.738337	8.984927

Visualisation

PAT based on Revenue for Each Stock
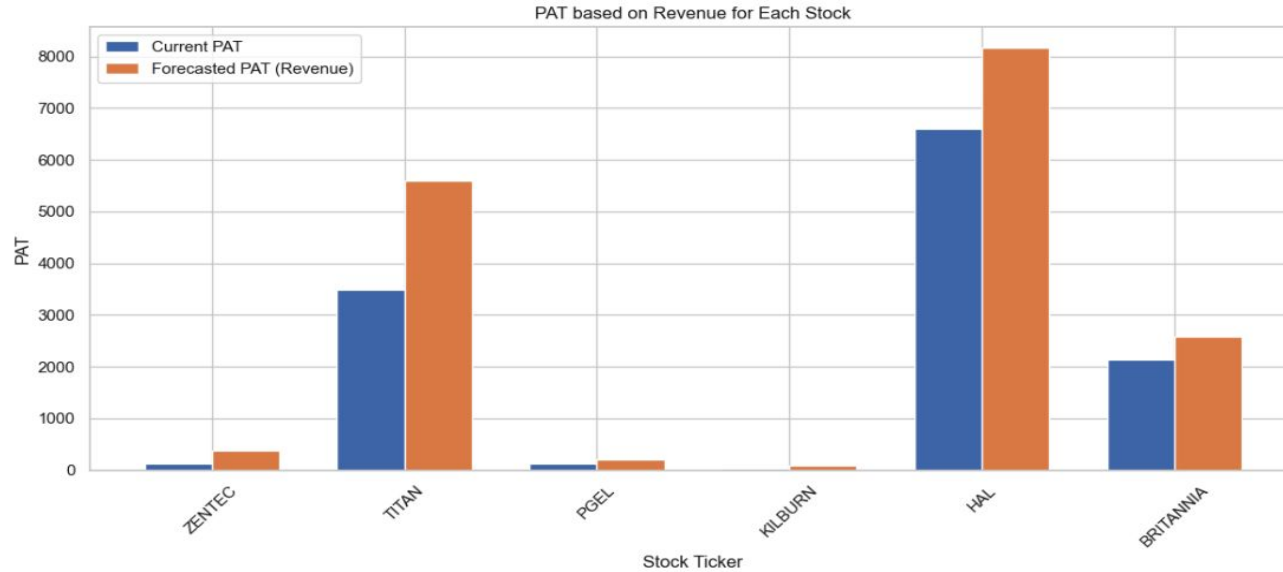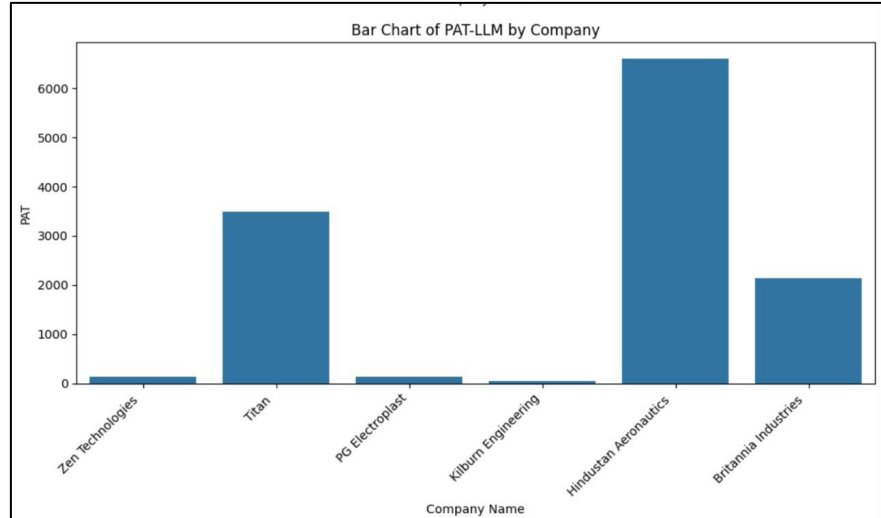

Ranking

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Ranked Stocks Based on PAT Growth Percentage:
   PAT_Rank STOCK_TICKER        COMPANY NAME   PAT      PAT_avg  PAT_Growth_%
0         1        PGEL       PG Electroplast   135   223.621510     65.645563
1         2       ZENTEC      Zen Technologies  130   205.940116     58.415474
2         3      KILBURN    Kilburn Engineering   40    62.819352     57.048379
3         4        TITAN                 Titan  3496  4881.608786     39.634119
4         5         HAL   Hindustan Aeronautics  6600  8726.352232     32.217458
5         6    BRITANNIA   Britannia Industries  2134  2325.738337      8.984927
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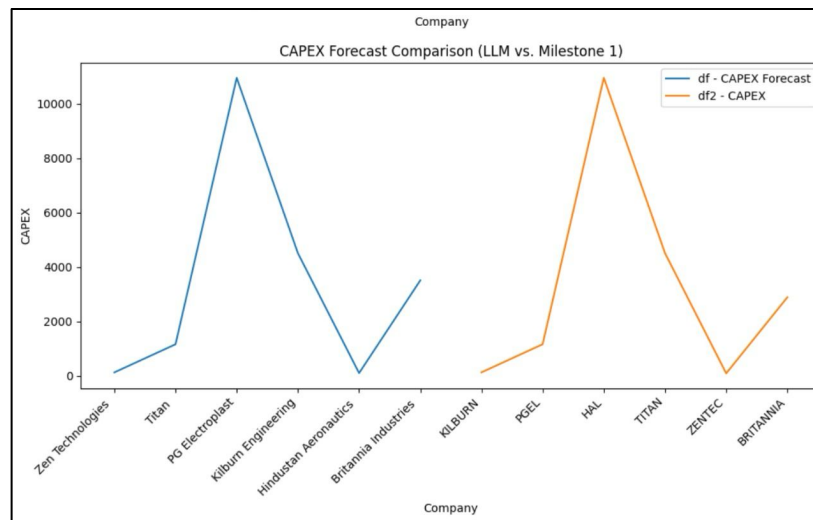
Milestone 2
Extracting guidance number using LLM

Bar Chart of PAT-LLM by Company

Bar Chart of REVENUE_2025_MILESTONE1 vs. Company

Bar Chart of EBITA_MARGIN_MILESTONE1 vs. Company

Bar Chart of CAPEX_MILESTONE1 vs. Company

Revenue Forecast Comparison (LLM vs. Milestone 1)

Margin Forecast Comparison (LLM vs. Milestone 1)

CAPEX Forecast Comparison (LLM vs. Milestone 1)
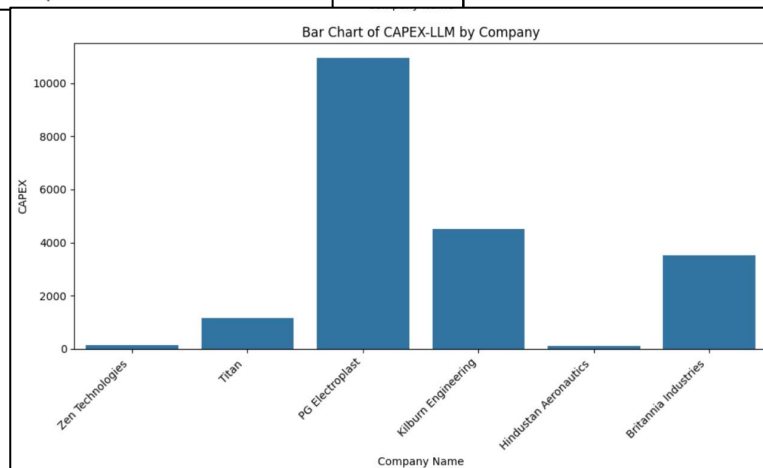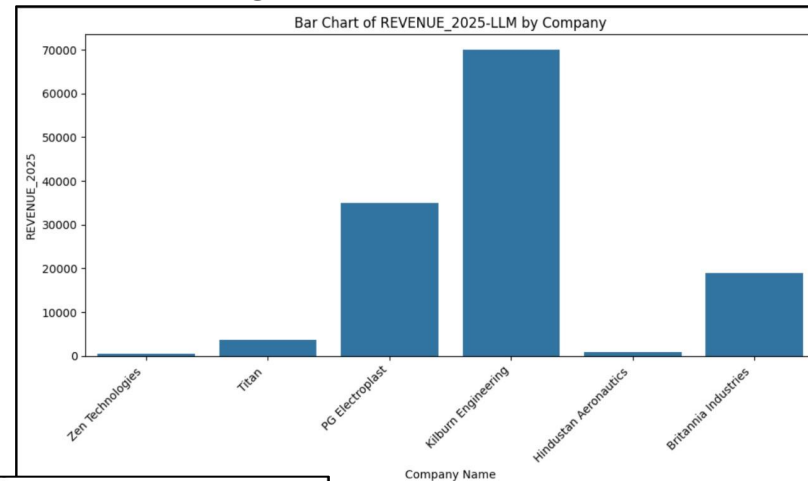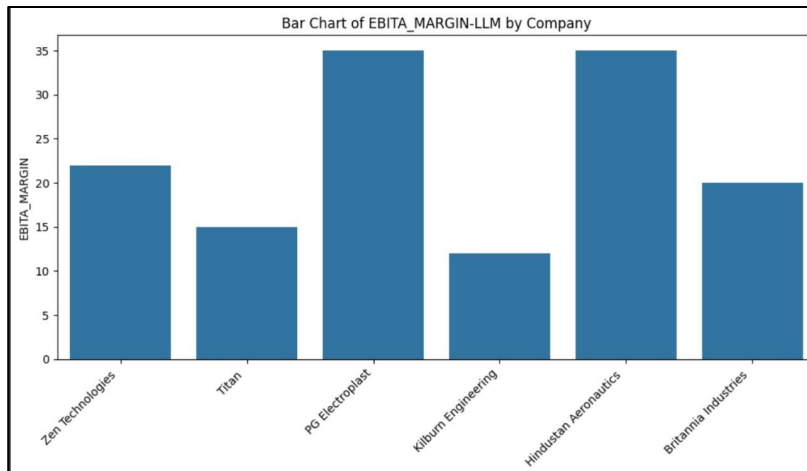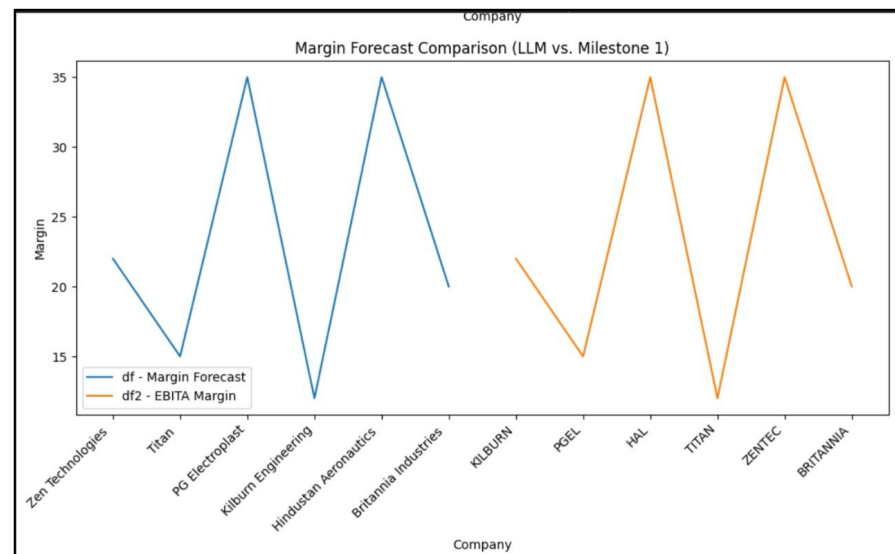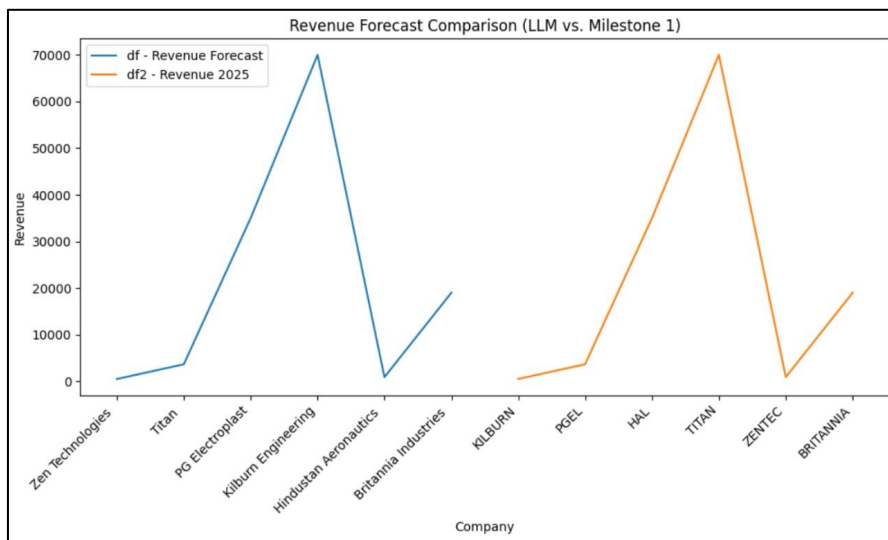
Milestone 3
Machine Learning for Financial Forecasting and PAT Prediction

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Model evaluation results with K-Fold Cross-Validation:
                 Model  Avg Test MAE
0      Linear Regression     59.714200
1  Polynomial Regression    363.544020
2      Lasso Regression      59.504579
3      Ridge Regression      59.603849
4      Bayesian Ridge        53.603554
5      Decision Tree        170.411500
6      Random Forest        137.699772
7            XGBoost        143.353153

Best Model: Bayesian Ridge
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	STOCK_TICKER	REVENUE_2025	EBITA_MARGIN	CAPEX (additional)	CAPEX
0	KLBRENG-B.BO	500	22	30	130
1	PGEL.NS	3650	15	380	1163
2	HAL.NS	35000	35	3000	10950
3	TITAN.NS	70000	12	800	4509
4	ZENTEC.NS	900	35	12	105

Predicted vs Actual PAT for Each Company
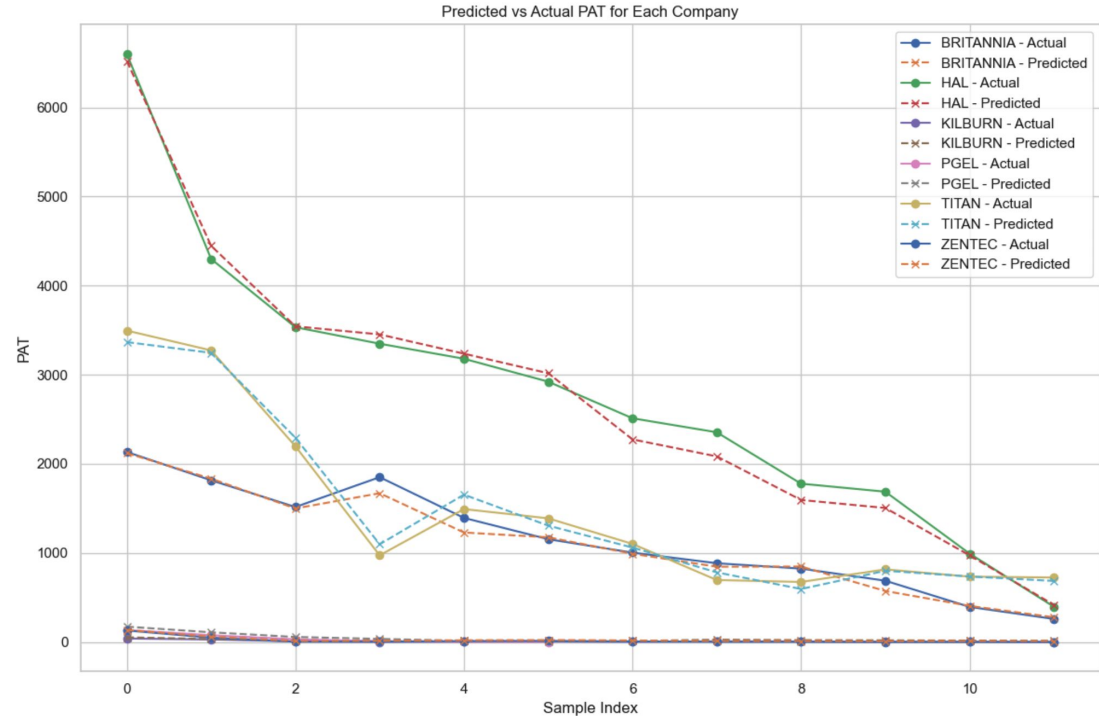
Predicted_Pat

	Company	Predicted_PAT
0	KLBRENG-B.BO	84.572953
1	PGEL.NS	351.146933
2	HAL.NS	8191.510387
3	TITAN.NS	5612.497670
4	ZENTEC.NS	229.427628
5	BRITANNIA.NS	2527.212340
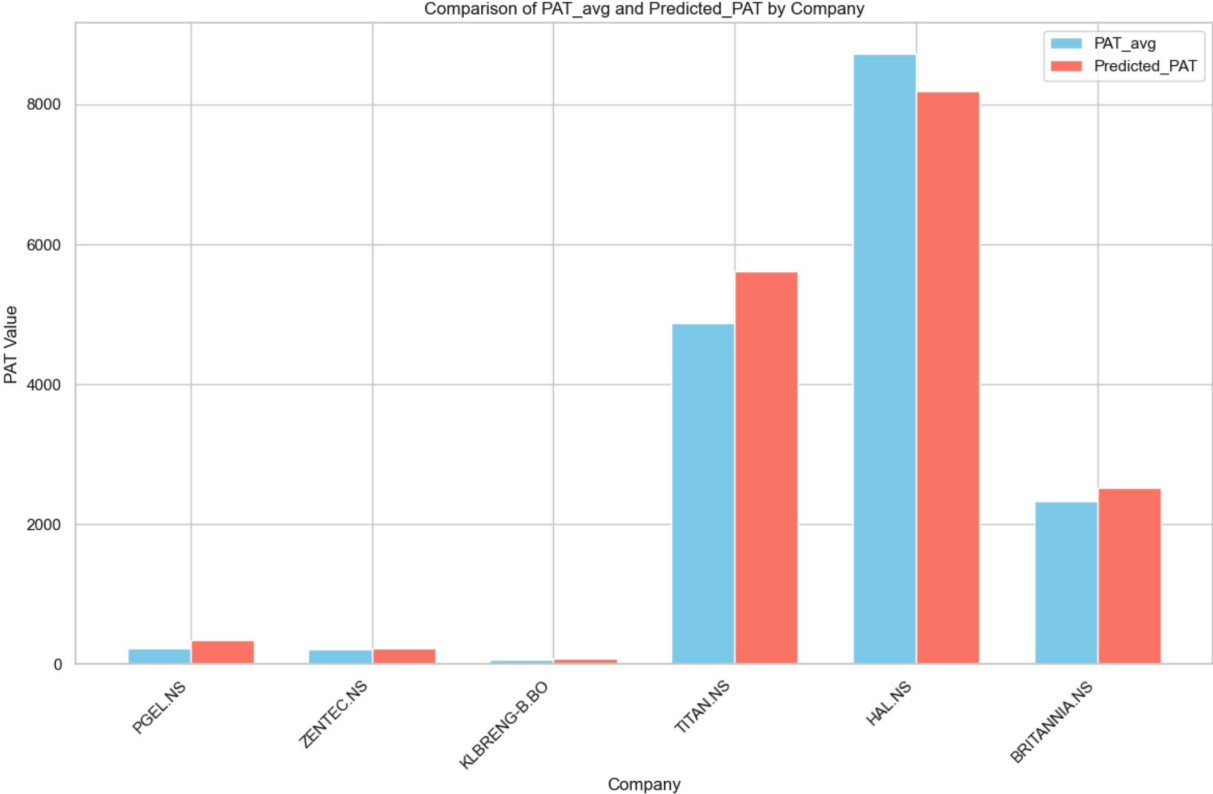
Comparison of PAT_avg and Predicted_PAT by Company

Dashboard

Milestone 4
Portfolio Optimization using ML-Driven Financial Metrics

Data using yfinance

Ticker	BRITANNIA.NS	HAL.NS	KLBRENG-B.BO	PGEL.NS	TITAN.NS	ZENTEC.NS
Date						
2020-11-10 00:00:00+00:00	-0.011259	0.012872	-0.069164	0.043459	0.015836	-0.022541
2020-11-11 00:00:00+00:00	-0.004447	0.004809	-0.015480	0.049979	-0.023518	0.013277
2020-11-12 00:00:00+00:00	0.006456	0.033158	-0.015723	0.049980	0.002667	0.057241
2020-11-13 00:00:00+00:00	-0.000242	0.006948	-0.012780	0.049868	0.008098	-0.019570
2020-11-14 00:00:00+00:00	0.003671	0.020241	0.025890	0.049658	-0.001281	0.016633

Porfolio Adj Price history
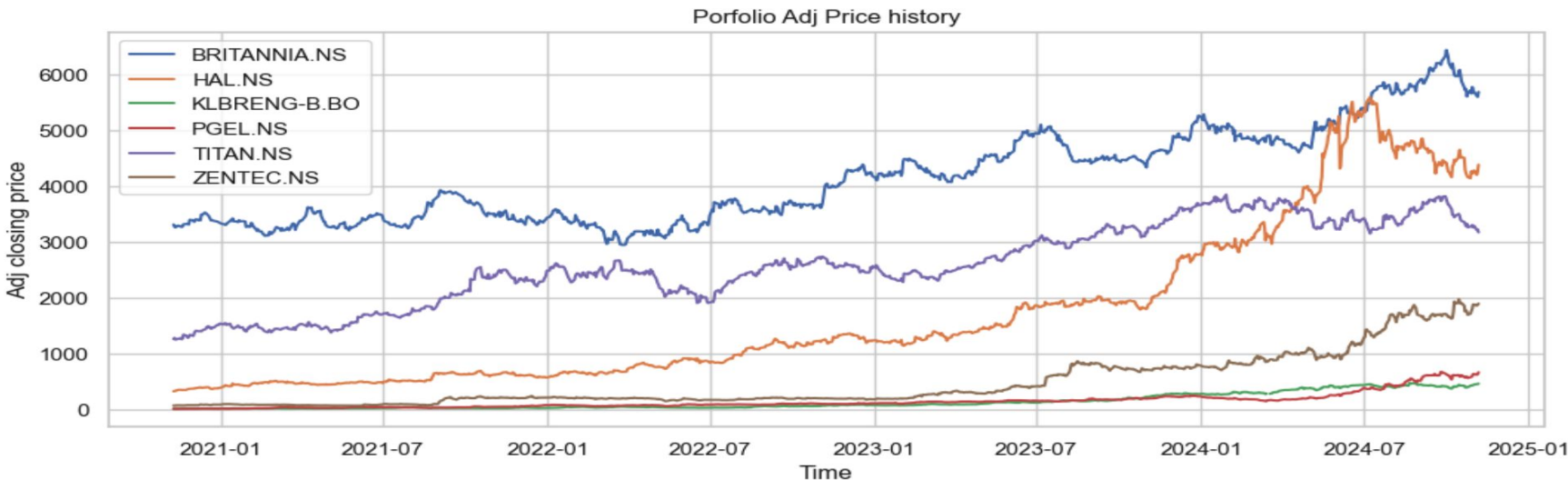
Annualized return

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Ticker
BRITANNIA.NS     0.170054
HAL.NS           1.057283
KLBRENG-B.BO     1.609021
PGEL.NS          2.243904
TITAN.NS         0.305763
ZENTEC.NS        1.598856
dtype: float64
```

Standard Deviation

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Standard Deviation of Daily Returns:
 Ticker
BRITANNIA.NS     1.235497
HAL.NS           2.156054
KLBRENG-B.BO     3.067298
PGEL.NS          3.372300
TITAN.NS         1.590285
ZENTEC.NS        3.182052
dtype: float64
```

Covariance matrix

Ticker	BRITANNIA.NS	HAL.NS	KLBRENG-B.BO	PGEL.NS	TITAN.NS	ZENTEC.NS
Ticker						
BRITANNIA.NS	0.000153	0.000026	0.000023	0.000020	0.000042	0.000012
HAL.NS	0.000026	0.000465	0.000123	0.000150	0.000073	0.000188
KLBRENG-B.BO	0.000023	0.000123	0.000941	0.000113	0.000061	0.000152
PGEL.NS	0.000020	0.000150	0.000113	0.001137	0.000087	0.000202
TITAN.NS	0.000042	0.000073	0.000061	0.000087	0.000253	0.000082
ZENTEC.NS	0.000012	0.000188	0.000152	0.000202	0.000082	0.001013

```
Minimum Variance Portfolio (MVP) without Short Selling:
Expected Annual Return: 34.66%
Risk (Volatility): 15.69%
Sharpe Ratio: 1.83

   Portfolio Weights:
   BRITANNIA.NS: 54.38%
   HAL.NS: 10.35%
   KLBRENG-B.BO: 5.22%
   PGEL.NS: 3.31%
   TITAN.NS: 23.00%
   ZENTEC.NS: 3.74%
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Tangency Portfolio (TP) without Short Selling:
Expected Annual Return: 87.81%
Risk (Volatility): 26.44%
Sharpe Ratio: 3.09

   Portfolio Weights:
   BRITANNIA.NS: 8.80%
   HAL.NS: 27.16%
   KLBRENG-B.BO: 23.08%
   PGEL.NS: 24.41%
   TITAN.NS: 0.00%
   ZENTEC.NS: 16.55%
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Efficient Frontier (No Short Selling)

Efficient Frontier (With Short Selling)