Collaborative Application Developmet

Msc Artificial Intelligence and Data Science

GROUP 4

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Intro

OVERVIEW

ASSUMPTIONS

OUR INITIAL APPROACH

THE CHANGES
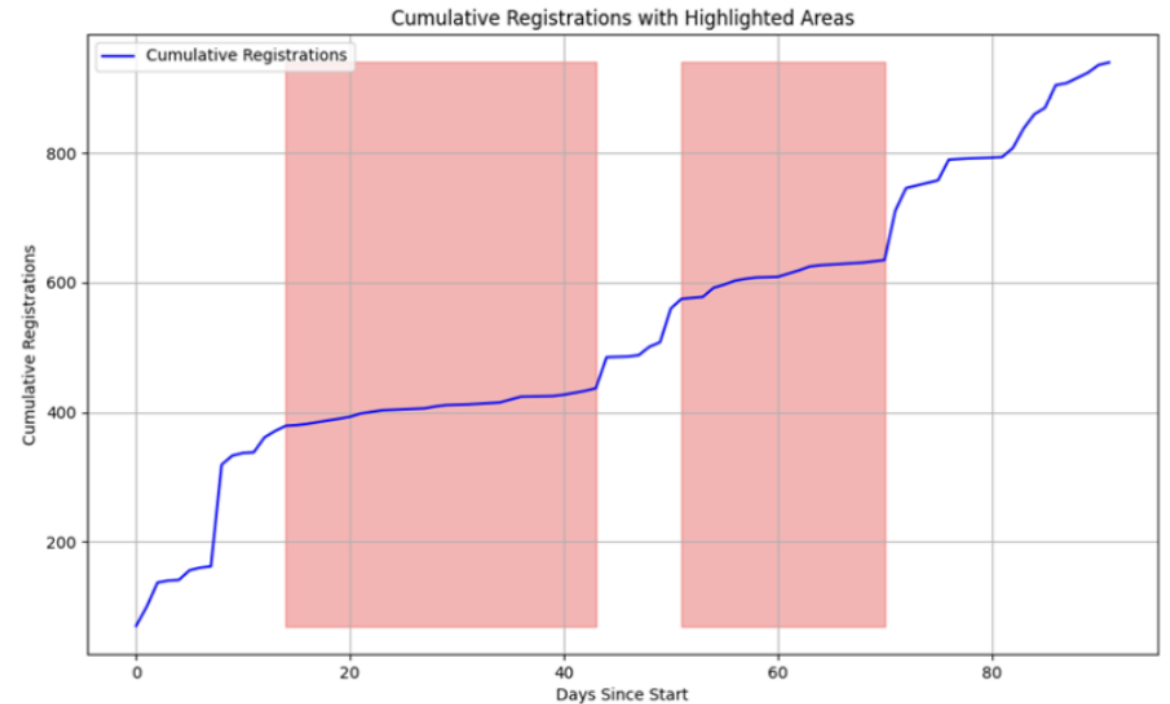
Methods

- Data cleaning and visualization

- Statistical analysis

Methods
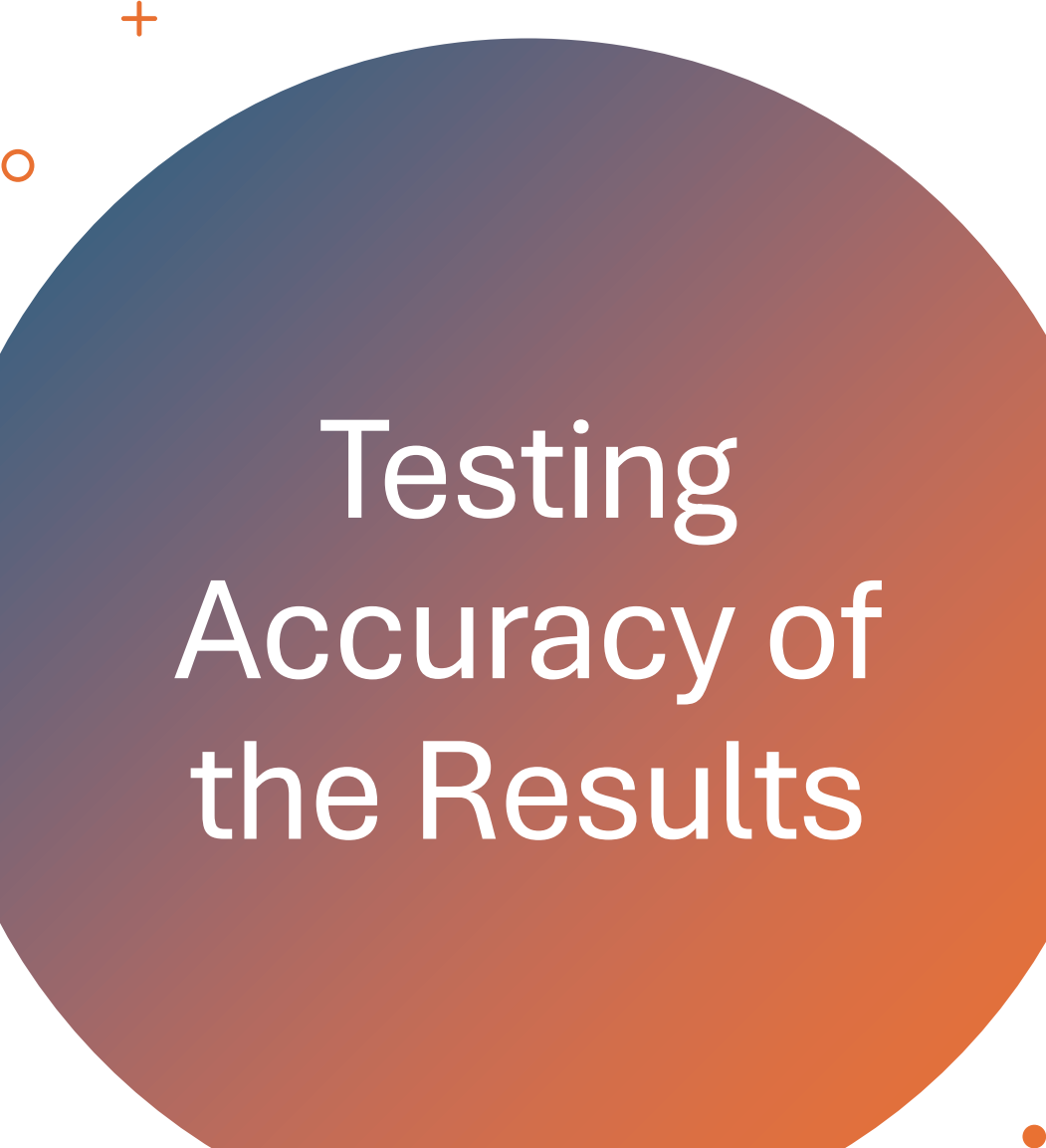
Results

- Gradients

- GUI – VISUAL DEMONSTRATION OF THE APPLICATION,

- Explanation of upper bounds and lower bounds etc

Testing Accuracy of the Results

- **Metrics used**
- **Testing results**
- **Evaluation and Future Work**

Metrics Used

- **MAPE (Mean Absolute Percentage Error)**
  - Provides insight into the accuracy of predictions relative to actual values.

- **Forecast Bias**
  - Indicates consistent over-forecasting or under-forecasting tendencies.

- **Forecast Accuracy:**
  - Reflects how close actual values are to forecasted quantities.
  - Essential for ensuring reliable and precise forecasting outcomes.

Testing Results

- **Initial Testing**
  - Only 2 out of 7 data files fit well

- **Impact of Variance**
  - Almost all data files now align effectively with the model.
  - Variances enhanced the model's reliability and suitability for forecasting.

Testing Results (without Variance)

Test Case	Actual Value	Forecast	upper	lower	MAPE (forecast)	MAPE(upper)	MAPE(lower)	MAPE(AVG)	Range	Data File	Pass/Fail	Comments
1	437	442	467	418	1.14%	6.86%	4.35%	4.12%	14-43	SRM22	1	Accurately predicts
2	635	616	632	600	2.99%	0.47%	5.51%	2.99%	51-70	SRM22	1	Accurately predicts
3	169	823	1093	554	386.98%	546.75%	227.81%	387.18%	20-338	NP21	0	Doesn't accurately predict.
4	224	289	326	252	29.02%	45.54%	12.50%	29.02%	343-387	NP21	0	Doesn't accurately predict (comes very close being 28 registrations off). Actual gradient is only slightly lower than forecast
5	5	54	76	33	980.00%	1420.00%	560.00%	986.67%	0-25	SRM23	0	Doesn't accurately predict (comes very close being 28 registrations off). Actual gradient is only slightly lower than forecast
6	359	372	427	316	3.62%	18.94%	11.98%	11.51%	40-105	SRM23	1	Accurately predicts
7	151	143	151	136	5.30%	0.00%	9.93%	5.08%	7-16	MSE21	1	Accurately predicts
8	303	259	267	250	14.52%	11.88%	17.49%	14.63%	17-27	MSE21	0	Doesn't accurately predict (comes very close being 36 registrations off). Actual gradient is only slightly higher than forecast
9	900	877	881	874	2.56%	2.11%	2.89%	2.52%	38-42	MSE21	0	Doesn't accurately predict (comes very close being 23 registrations off). Actual gradient is only slightly higher than forecast
10	753	235	327	144	68.79%	56.57%	80.88%	68.75%	0-108	D19	0	Doesn't accurately predict. Could be due to COVID affecting trend.
11	229	370	478	261	61.57%	108.73%	13.97%	61.43%	2-130	GP21	0	Doesn't accurately predict (comes very close being 32 registrations off). Actual gradient is only slightly lower than forecast
12	39	694	964	425	1679.49%	2371.79%	989.74%	1680.34%	0-318	D21	0	Doesn't accurately predict. Could be due to COVID affecting trend.

4/12 correctly predicted										0	Fail	
9/12 correctly predicted or reasonably close to accurate predictions										1	Pass	
3/10 completely innacurate predictions												

Testing Results (with Variance)

Test Case	Actual Value	Forecast Value	upper	lower	MAPE (forecast)	MAPE(upper)	MAPE(lower)	forecast bias	Range	Data File	Pass/Fail	Comments
1	437	436	497	375	0.23%	13.73%	14.19%	0.002293578	14-43	SRM22	1	Accurately predicts
2	635	604	670	537	4.88%	5.51%	15.43%	0.051324503	51-70	SRM22	1	Accurately predicts
3	169	695	1023	368	311.24%	505.33%	117.75%	-0.756834532	20-38	NP21	0	Rranges out of bound
4	224	267	327	207	19.20%	45.98%	7.59%	-0.161048689	343-387	NP21	1	Accurately predicts
5	5	56	82	30	1020.00%	1540.00%	500.00%	-0.910714286	0-25	SRM23	0	Ranges out of bound
6	359	329	374	283	8.36%	4.18%	21.17%	0.09118541	40-105	SRM23	1	Accurately predicts
7	149	146	166	125	2.01%	11.41%	16.11%	0.020547945	7-16	MSE21	1	Accurately predicts
8	303	270	304	235	10.89%	0.33%	22.44%	0.122222222	17-27	MSE21	1	Accurately predicts
9	900	840	914	766	6.67%	1.56%	14.89%	0.071428571	38-42	MSE21	1	Accurately predicts
10	753	474	550	398	37.05%	26.96%	47.14%	0.588607595	0-108	D19	0	Ranges out of bound
11	385	383	441	326	0.52%	14.55%	15.32%	0.005221932	36-85	D19	1	Accurately predicts
12	229	353	491	215	54.15%	114.41%	6.11%	-0.351274788	1-129	GP21	1	Accurately predicts
13	199	162	200	124	18.59%	0.50%	37.69%	0.228395062	338-336	D21	1	Accurately predicts
14	355	310	365	255	12.68%	2.82%	28.17%	0.14516129	393-426	NP21	1	Accurately predicts
						forecast accuracy	78.57%				11	

11/14 correctly predicted

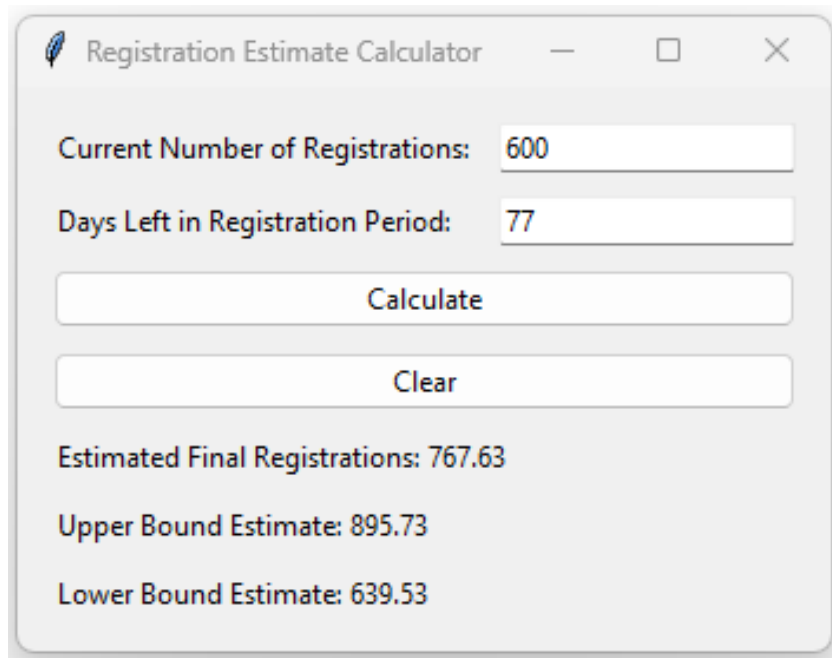**3/14 completely innacurate predictions**

Evaluation

- **Forecast bias**
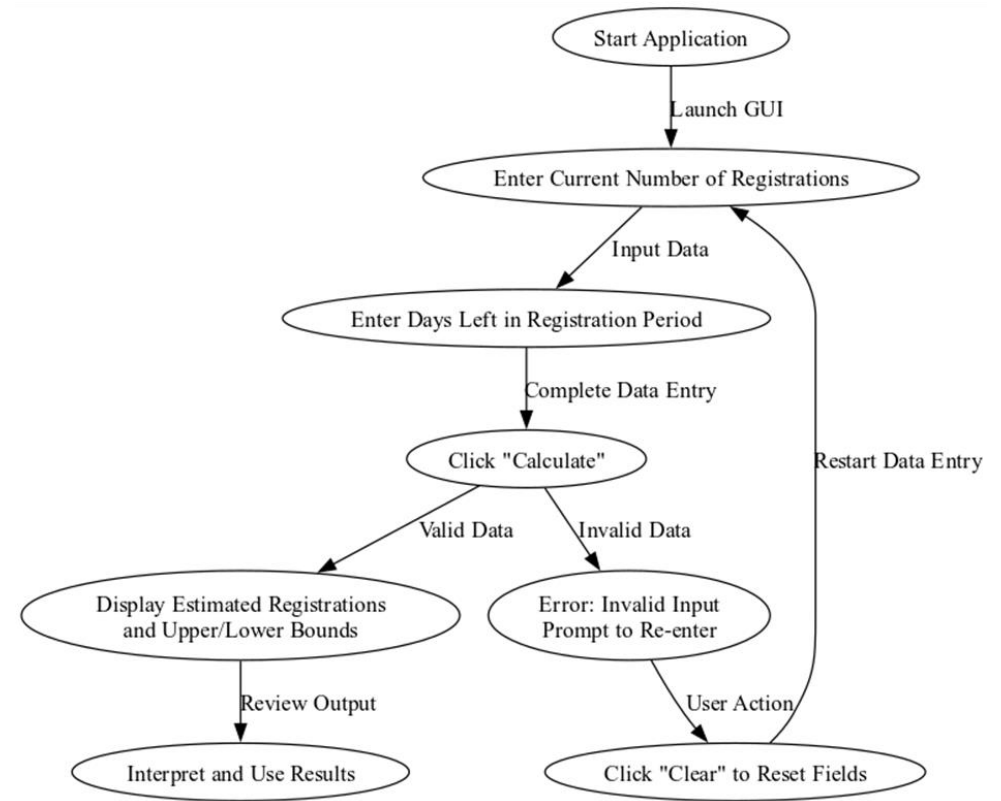 - Data shows a mix of overestimation and underestimation in forecasts.

- **MAPE analysis**
  - Provided insights into forecast accuracy relative to actual demand.

Graphical User Interface

Registration Estimate Calculator

Current Number of Registrations: 600

Days Left in Registration Period: 77

Calculate

Clear

Estimated Final Registrations: 767.63

Upper Bound Estimate: 895.73

Lower Bound Estimate: 639.53

Start Application
→ Launch GUI →
Enter Current Number of Registrations
→ Input Data →
Enter Days Left in Registration Period
→ Complete Data Entry →
Click "Calculate"
→ Valid Data → Display Estimated Registrations and Upper/Lower Bounds
→ Invalid Data → Error: Invalid Input Prompt to Re-enter
Restart Data Entry
→ Review Output → Interpret and Use Results
→ User Action → Click "Clear" to Reset Fields

Future Work

- Continuously refine the model.

- Explore additional influencing factors.

- Monitor performance for more precise predictions.

Discussion

Expounding of the findings