airbnb

Insights & Impacts: Airbnb Through the Lens of Covid-19

Presented by: Aishwarya Ajaykumar, Anupama M, Prathyusha Reddy Midudhula, Sohan Shetty, Veda Samhitha Alluri

MGMT 58500 IT Project Management

Agenda

Problem Definition

01 Background

The Covid-19 pandemic has significantly impacted Airbnb, a key sharing economy player, due to travel restrictions, shifting consumer behaviours, and changing health guidelines.

02 Objective

Analyze Airbnb data for New York and Seattle, supplemented with external Covid-19 data, to uncover the multifaceted impacts of the Covid-19 pandemic on Airbnb's operations and market dynamics.

03 Scope

This project will focus on descriptive and analytical examinations of Airbnb listings and their list pricing and factors affecting it before, during and after the Covid-19 pandemic.

airbnb
Data Summary

New York

- ~8k listings with 'Entire home/apt' dominating in listing type
- ~3.7k unique hosts
- Average list price before Covid-19: ~$114
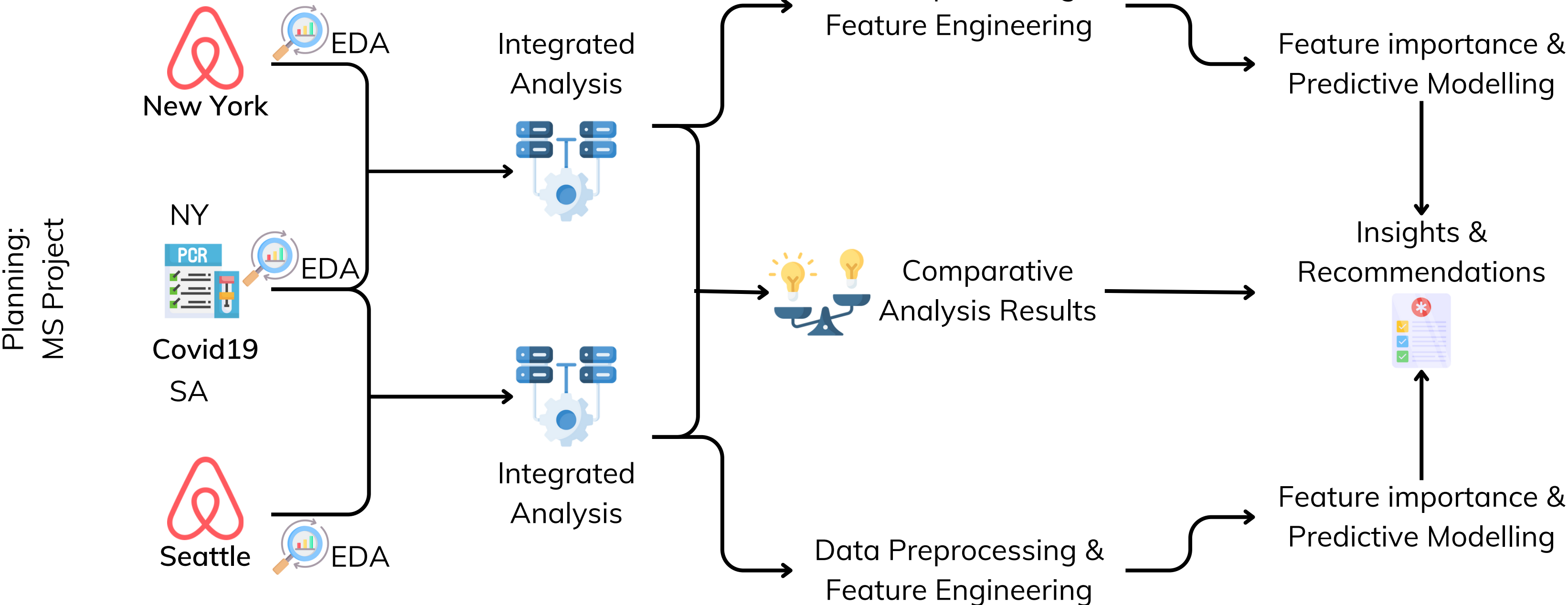- Average List price after Covid-19: ~$122

Seattle

- ~7k listings with 'Entire home/apt' dominating in listing type
- ~3.5k unique hosts
- Average list price before Covid-19: ~$150
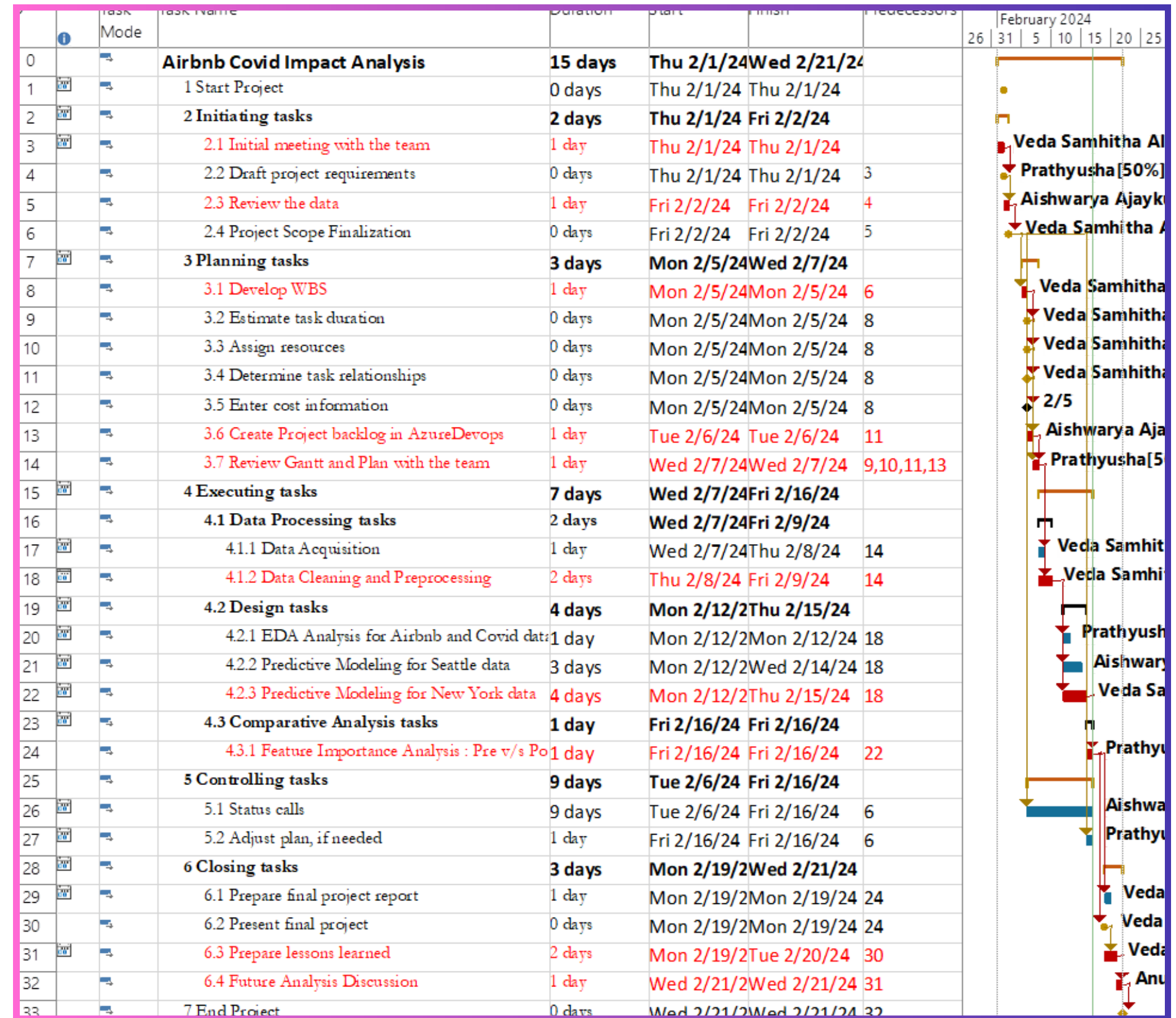- Average List price after Covid-19: ~$164
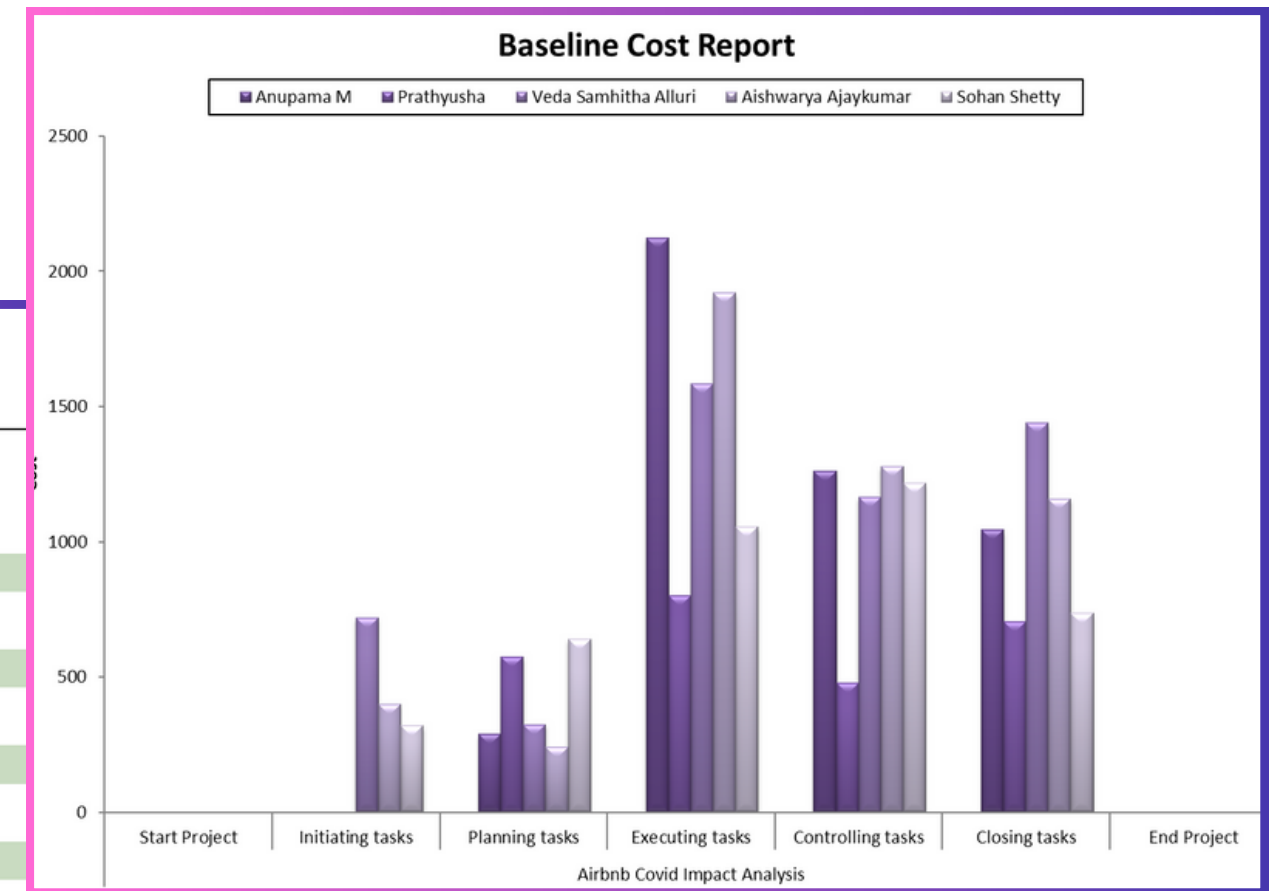
Workflow

Agile WoW: AzureDevOps

Planning: MS Project

New York — EDA

NY
PCR — EDA
Covid19
SA

Seattle — EDA

Integrated Analysis

Integrated Analysis

Data Preprocessing & Feature Engineering

Comparative Analysis Results

Data Preprocessing & Feature Engineering

Feature importance & Predictive Modelling

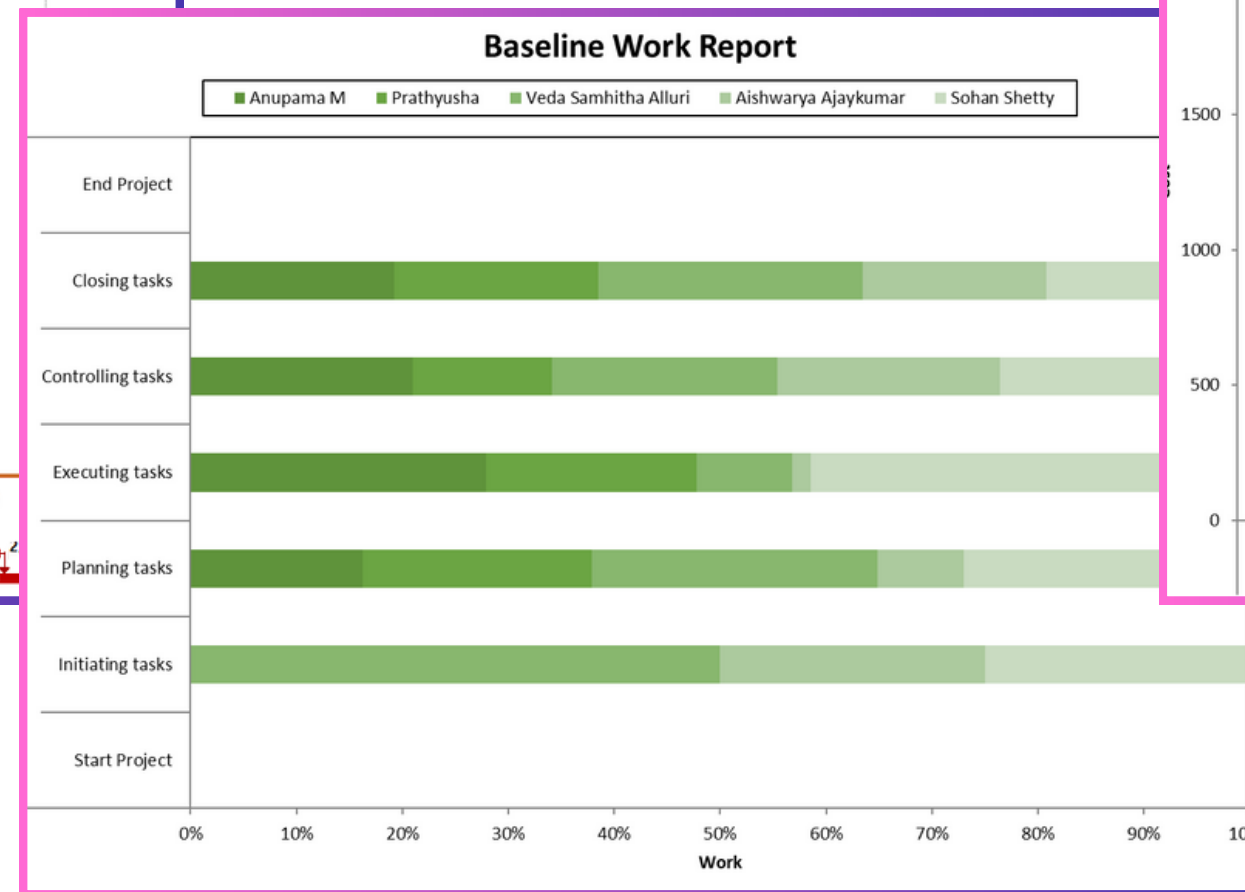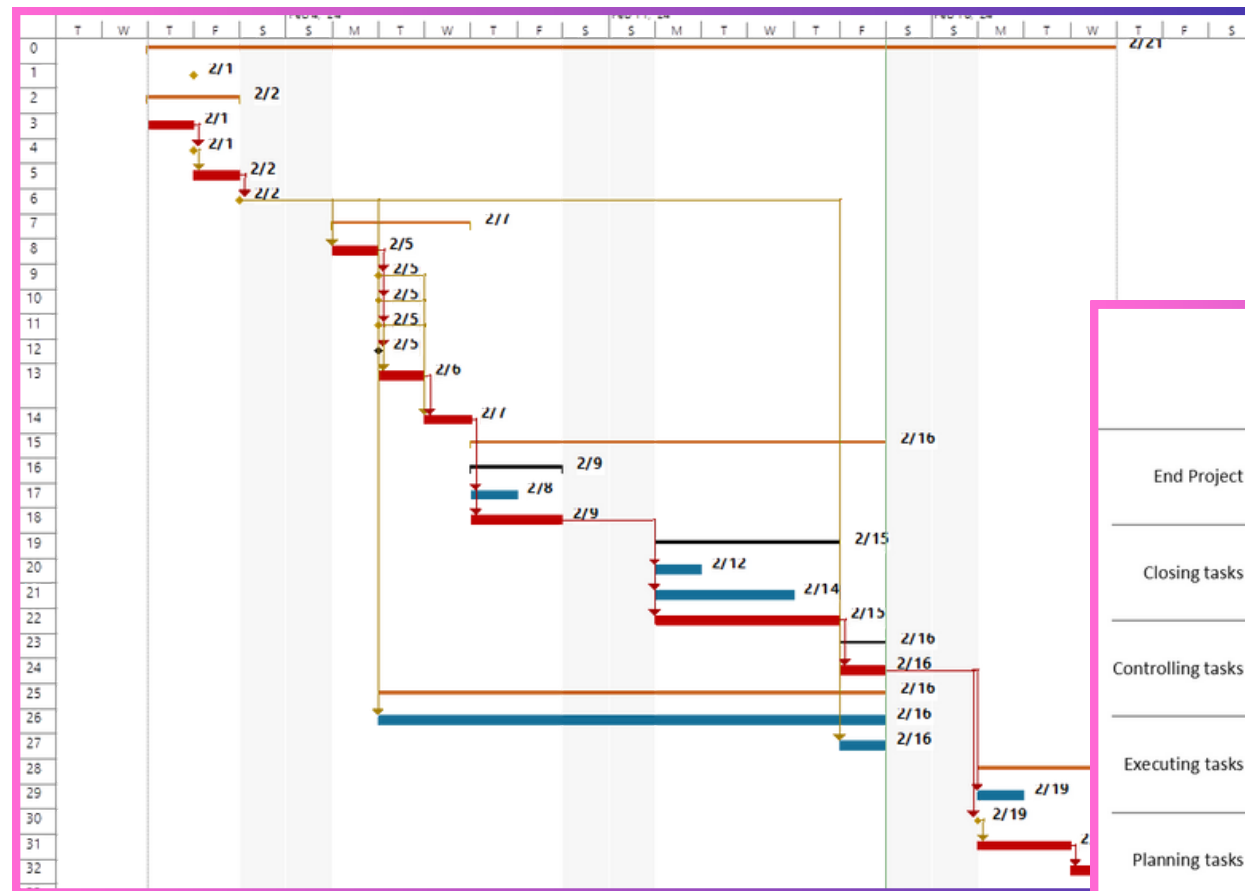Insights & Recommendations

Feature importance & Predictive Modelling

Plan: Microsoft Project

- Proper task management, including setting realistic timelines and understanding dependencies, is key.

		Task Mode	Task Name	Duration	Start	Finish	Predecessors	February 2024 26 31 5 10 15 20 25
0			**Airbnb Covid Impact Analysis**	**15 days**	**Thu 2/1/24**	**Wed 2/21/24**		Veda Samhitha Al
1			1 Start Project	0 days	Thu 2/1/24	Thu 2/1/24		
2			**2 Initiating tasks**	**2 days**	**Thu 2/1/24**	**Fri 2/2/24**		
3			2.1 Initial meeting with the team	1 day	Thu 2/1/24	Thu 2/1/24		Veda Samhitha Al
4			2.2 Draft project requirements	0 days	Thu 2/1/24	Thu 2/1/24	3	Prathyusha[50%]
5			2.3 Review the data	1 day	Fri 2/2/24	Fri 2/2/24	4	Aishwarya Ajayk
6			2.4 Project Scope Finalization	0 days	Fri 2/2/24	Fri 2/2/24	5	Veda Samhitha A
7			**3 Planning tasks**	**3 days**	**Mon 2/5/24**	**Wed 2/7/24**		
8			3.1 Develop WBS	1 day	Mon 2/5/24	Mon 2/5/24	6	Veda Samhitha
9			3.2 Estimate task duration	0 days	Mon 2/5/24	Mon 2/5/24	8	Veda Samhitha
10			3.3 Assign resources	0 days	Mon 2/5/24	Mon 2/5/24	8	Veda Samhitha
11			3.4 Determine task relationships	0 days	Mon 2/5/24	Mon 2/5/24	8	Veda Samhitha
12			3.5 Enter cost information	0 days	Mon 2/5/24	Mon 2/5/24	8	2/5
13			3.6 Create Project backlog in AzureDevops	1 day	Tue 2/6/24	Tue 2/6/24	11	Aishwarya Aja
14			3.7 Review Gantt and Plan with the team	1 day	Wed 2/7/24	Wed 2/7/24	9,10,11,13	Prathyusha[5
15			**4 Executing tasks**	**7 days**	**Wed 2/7/24**	**Fri 2/16/24**		
16			**4.1 Data Processing tasks**	**2 days**	**Wed 2/7/24**	**Fri 2/9/24**		
17			4.1.1 Data Acquisition	1 day	Wed 2/7/24	Thu 2/8/24	14	Veda Samhit
18			4.1.2 Data Cleaning and Preprocessing	2 days	Thu 2/8/24	Fri 2/9/24	14	Veda Samhi
19			**4.2 Design tasks**	**4 days**	**Mon 2/12/2**	**Thu 2/15/24**		
20			4.2.1 EDA Analysis for Airbnb and Covid data	1 day	Mon 2/12/2	Mon 2/12/24	18	Prathyush
21			4.2.2 Predictive Modeling for Seattle data	3 days	Mon 2/12/2	Wed 2/14/24	18	Aishwary
22			4.2.3 Predictive Modeling for New York data	4 days	Mon 2/12/2	Thu 2/15/24	18	Veda Sa
23			**4.3 Comparative Analysis tasks**	**1 day**	**Fri 2/16/24**	**Fri 2/16/24**		
24			4.3.1 Feature Importance Analysis : Pre v/s Po	1 day	Fri 2/16/24	Fri 2/16/24	22	Prathyu
25			**5 Controlling tasks**	**9 days**	**Tue 2/6/24**	**Fri 2/16/24**		
26			5.1 Status calls	9 days	Tue 2/6/24	Fri 2/16/24	6	Aishwa
27			5.2 Adjust plan, if needed	1 day	Fri 2/16/24	Fri 2/16/24	6	Prathy
28			**6 Closing tasks**	**3 days**	**Mon 2/19/2**	**Wed 2/21/24**		
29			6.1 Prepare final project report	1 day	Mon 2/19/2	Mon 2/19/24	24	Veda
30			6.2 Present final project	0 days	Mon 2/19/2	Mon 2/19/24	24	Veda
31			6.3 Prepare lessons learned	2 days	Mon 2/19/2	Tue 2/20/24	30	Veda
32			6.4 Future Analysis Discussion	1 day	Wed 2/21/2	Wed 2/21/24	31	Anu
33			7 End Project	0 days	Wed 2/21/2	Wed 2/21/24	32	

MS Project

- Efficient resource allocation and management were key to staying within budget and meeting deadlines.

Agile: Azure DevOps

- Underestimating the resources needed for a task can lead to project delays.
- There were few tasks that were prone to underestimation of time, especially for data cleaning and preparation.

Agile: Azure DevOps

11   Data Cleaning and Preprocessing

Anupama M   0 comments   Add tag

| State | ● Closed | Area | Airbnb Covid Impact Analysis |
| Reason | 🔒 Moved out of state l... | Iteration | Airbnb Covid Impact Analysis\Iteration 1 |

Description

As data analyst, I want to clean and preprocess the acquired data, So that it is usable for analysis.

Acceptance Criteria

- Missing values are handled through imputation of rolling mean.
- Erroneous data entries are removed.
- Data is formatted as per the requirements documents.

Discussion

Planning

Story Points
3

Priority
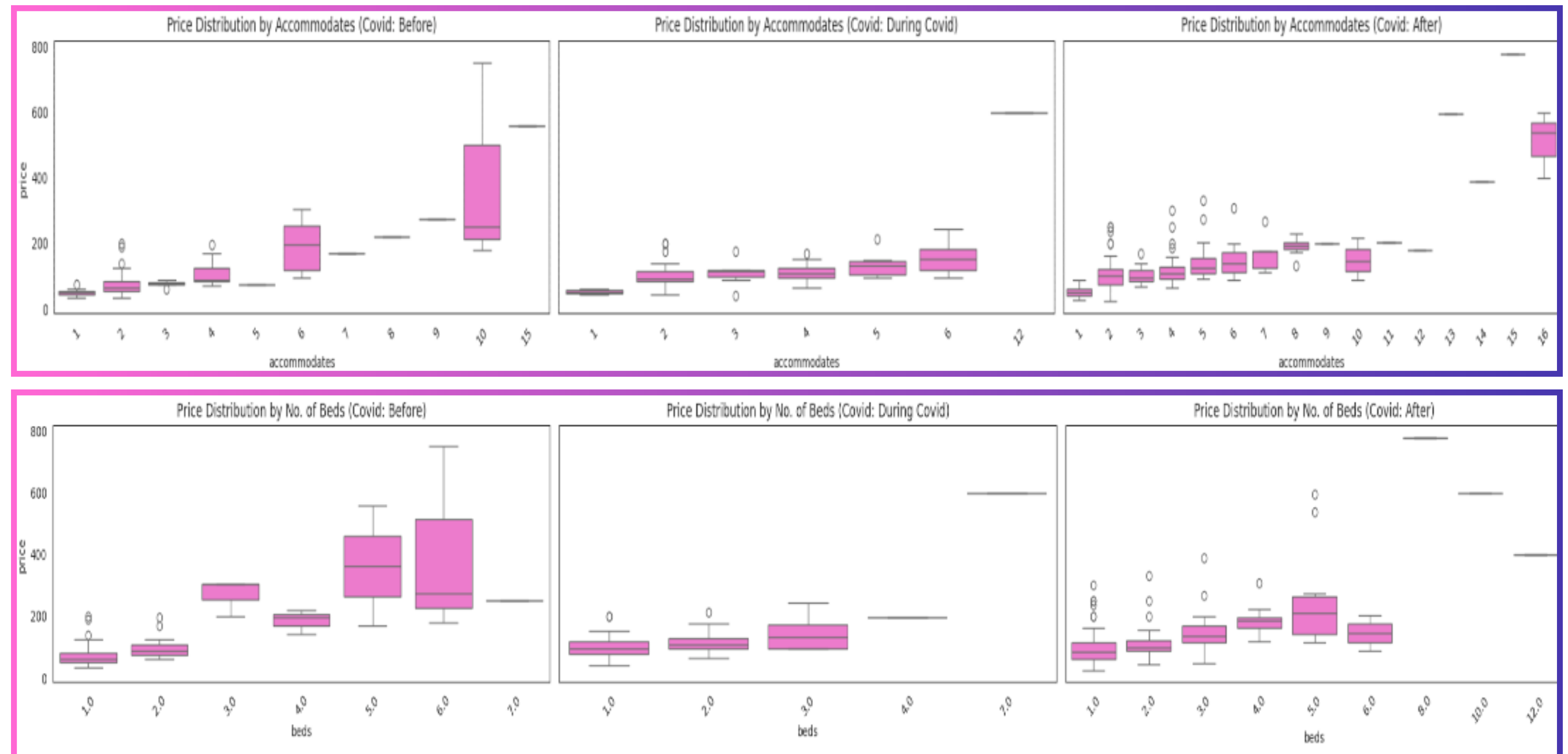1

Risk

Classification

Value area
Business

- Acceptance criteria has to be clear and concise
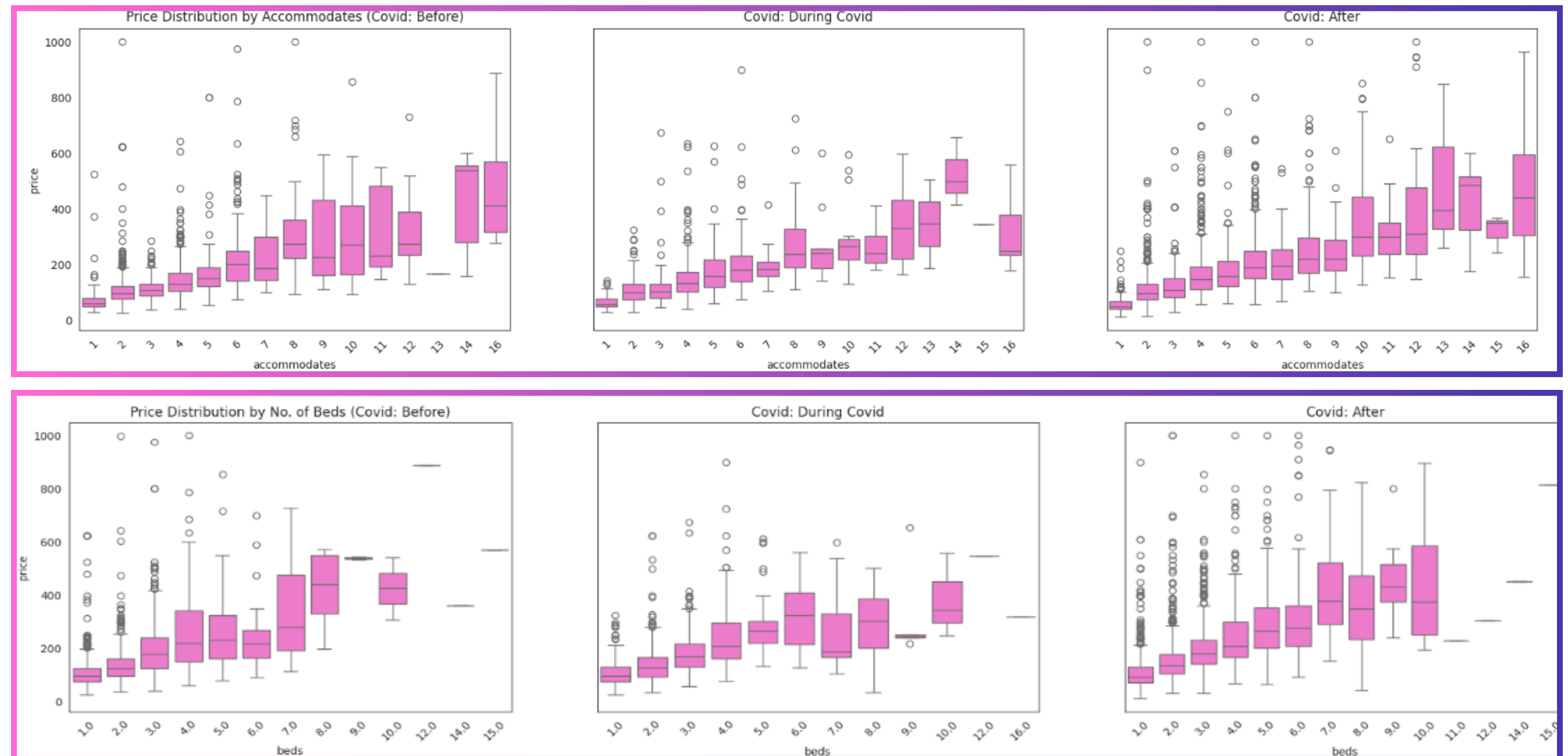
Exploratory Data Analysis – New York

airbnb

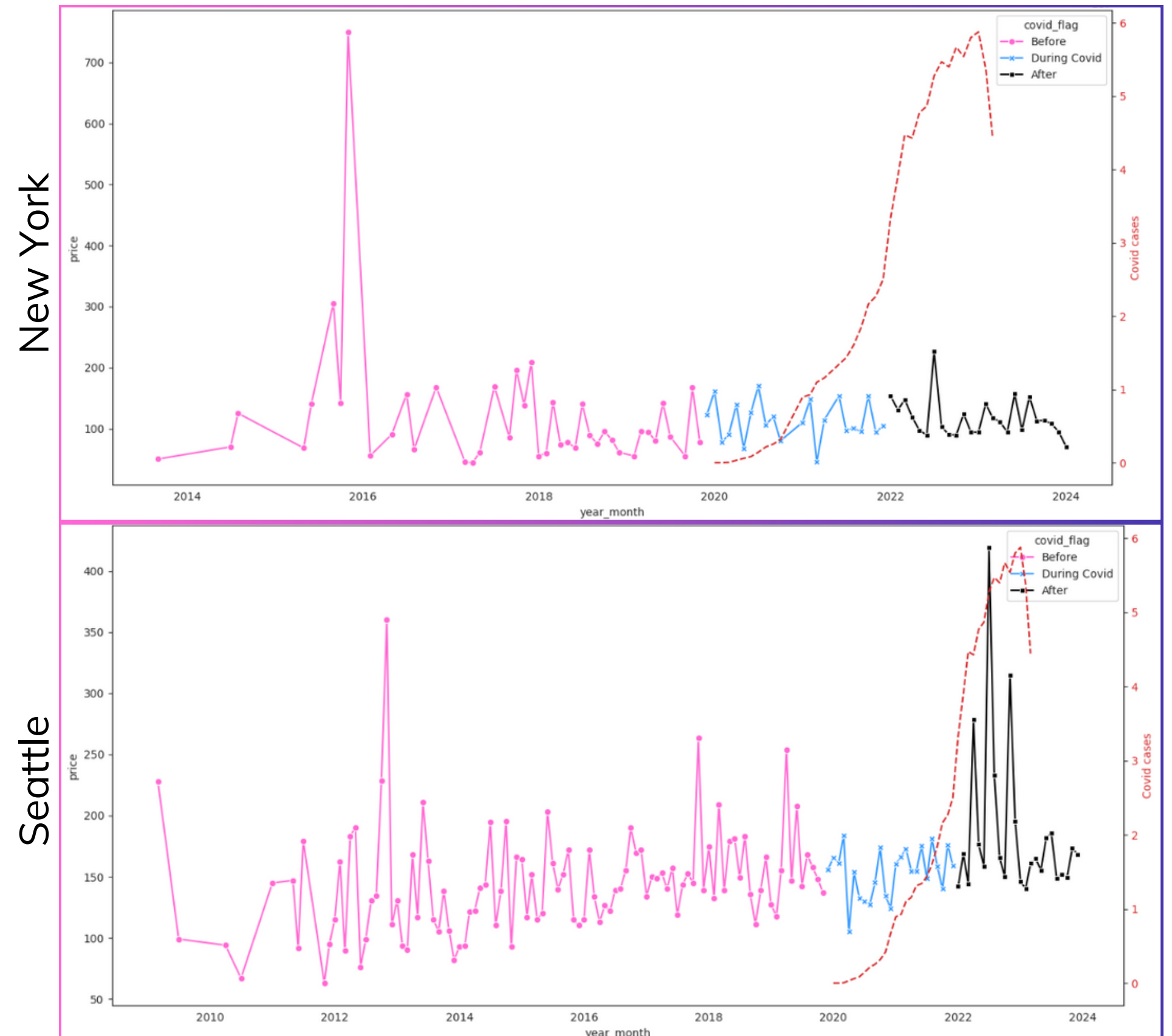In New York list prices increased by ~5% during Covid-19 and continues to increase

Price Distribution by Accommodates (Covid: Before)

Price Distribution by Accommodates (Covid: During Covid)

Price Distribution by Accommodates (Covid: After)

Price Distribution by No. of Beds (Covid: Before)

Price Distribution by No. of Beds (Covid: During Covid)

Price Distribution by No. of Beds (Covid: After)

Exploratory Data Analysis – Seattle

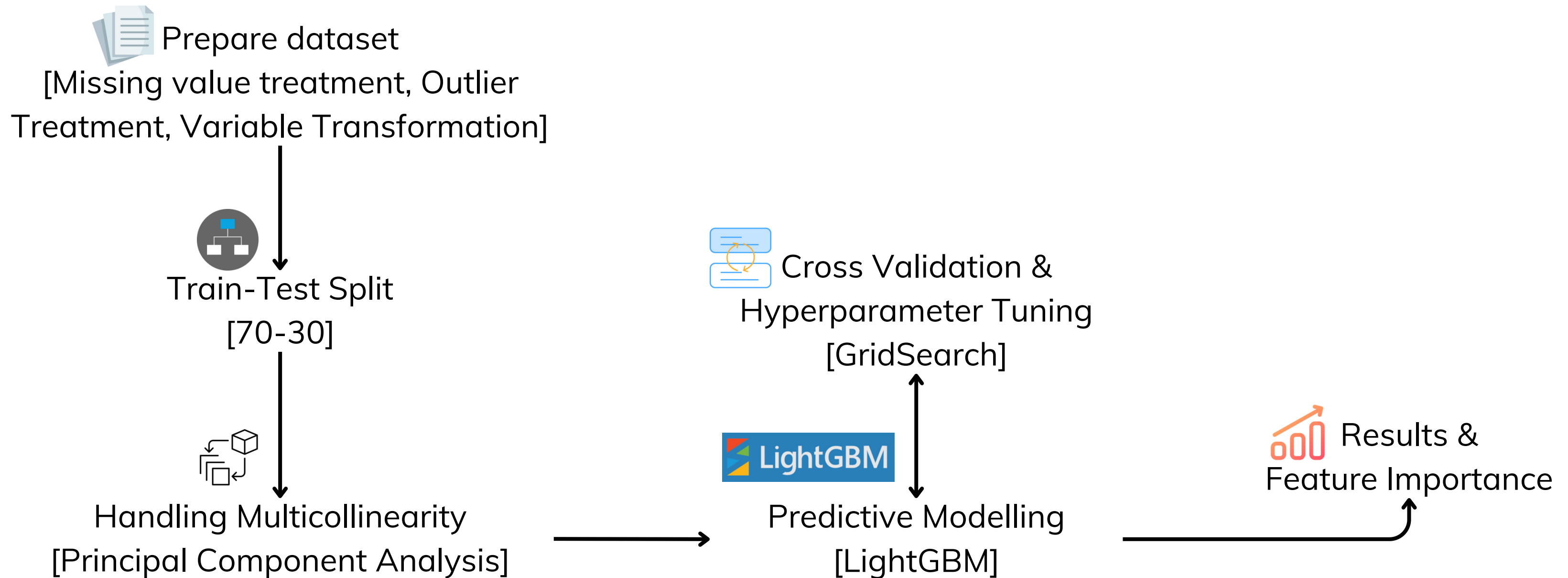In Seattle list prices increased by ~10% during Covid-19 and continues to increase

Exploratory Data Analysis

- Even though there is considerable increase in average list price during Covid-19 the after period does not show any significant impact in Seattle.
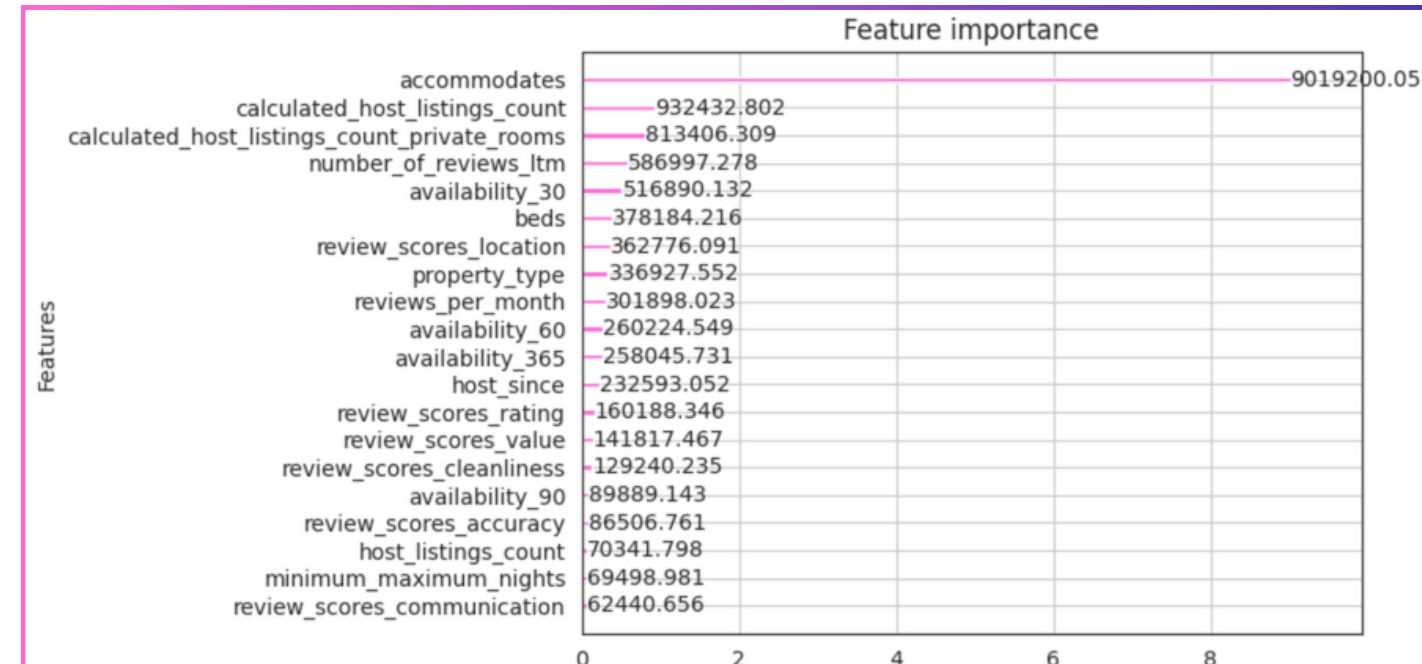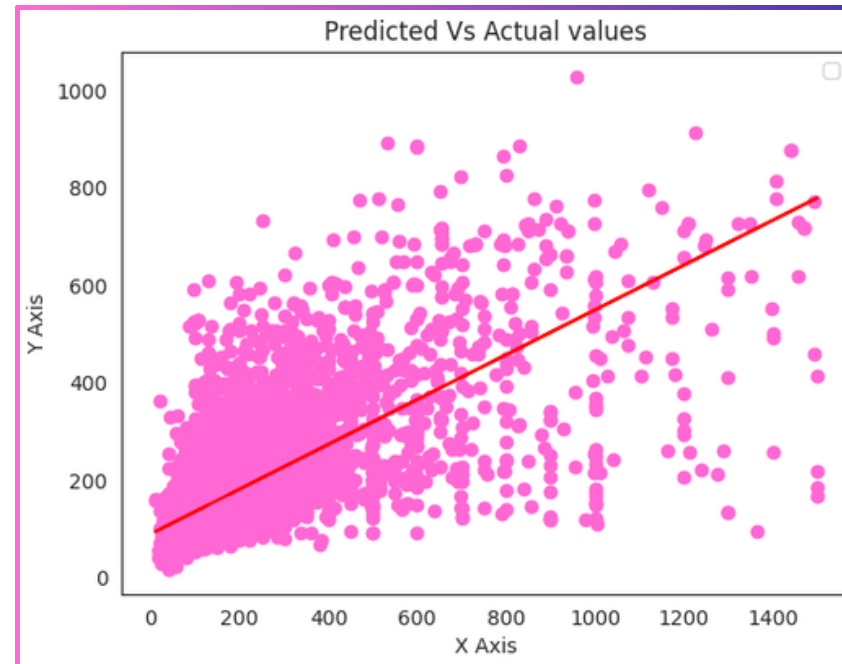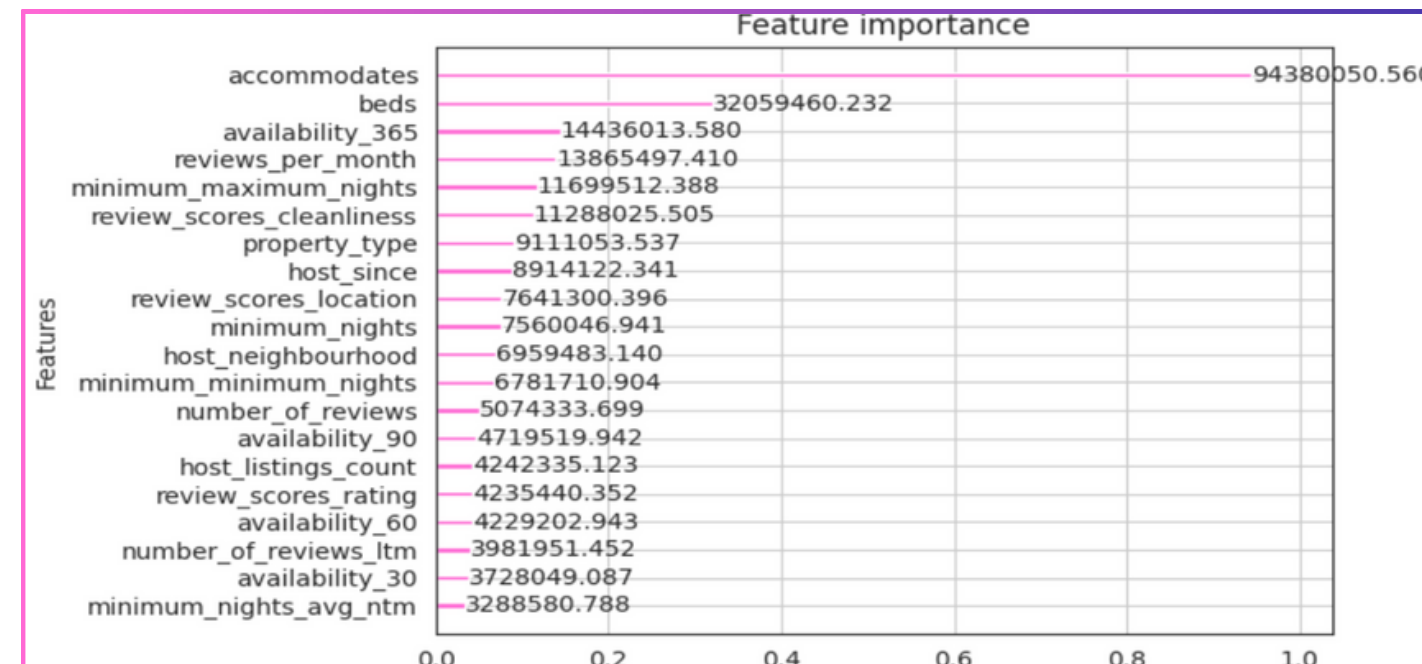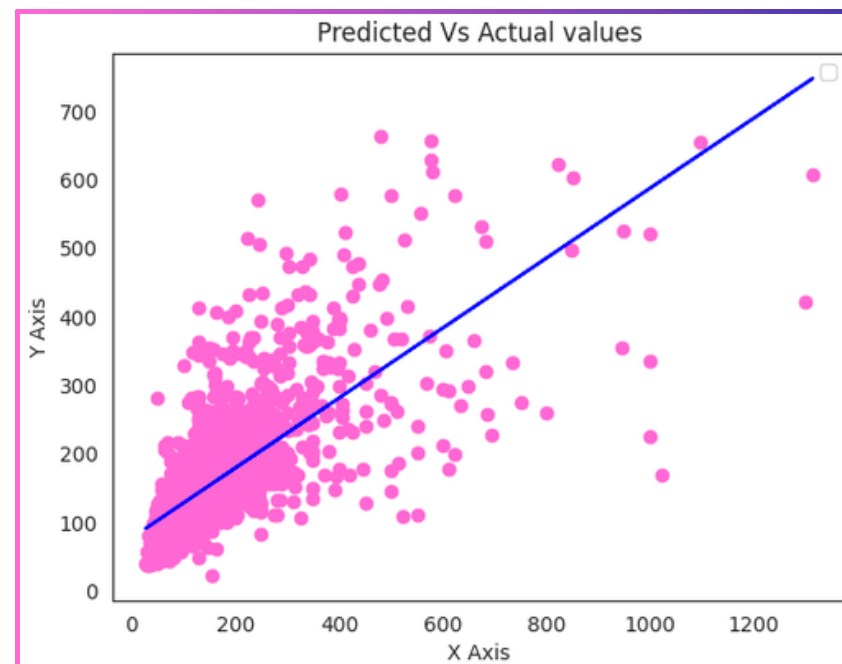
Predictive Modelling

📄 Prepare dataset
[Missing value treatment, Outlier Treatment, Variable Transformation]

↓

Train-Test Split
[70-30]

↓

Handling Multicollinearity
[Principal Component Analysis]

→

Predictive Modelling
[LightGBM]

↕

Cross Validation & Hyperparameter Tuning
[GridSearch]

→

Results & Feature Importance

Results

- The number of guests a property can accommodate, number of beds are the top factors affecting prices in both New York and Seattle.
- Multiple review-related columns have shown up as crucial in our analyses, highlighting how important customer experience is in deciding prices.

Customer Review Analysis

A quick look at the customer reviews reveals the most important features customers look for in a listing

Recommedations

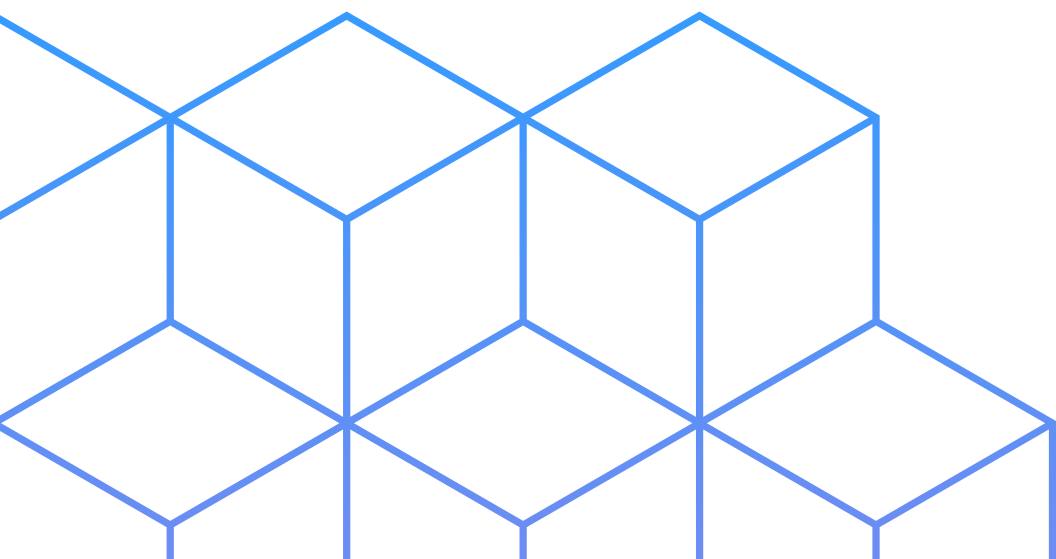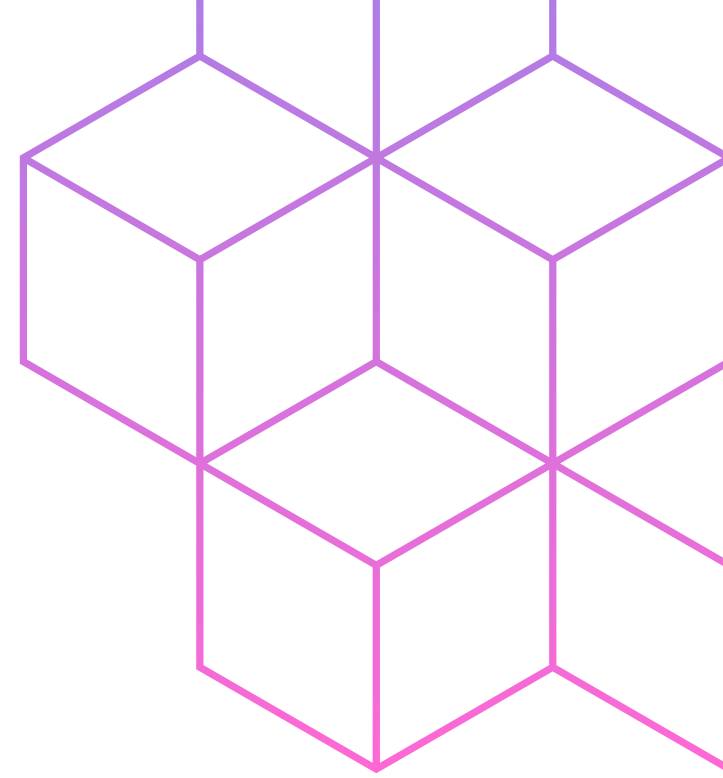## Importance of Customer Reviews

Our feature importance analysis suggests incorporating customer experience feedback into pricing strategies for better results.

Pricing Strategy

By carefully considering factors like capacity, number of beds, availability, and property type, Airbnb hosts can make informed pricing decisions.
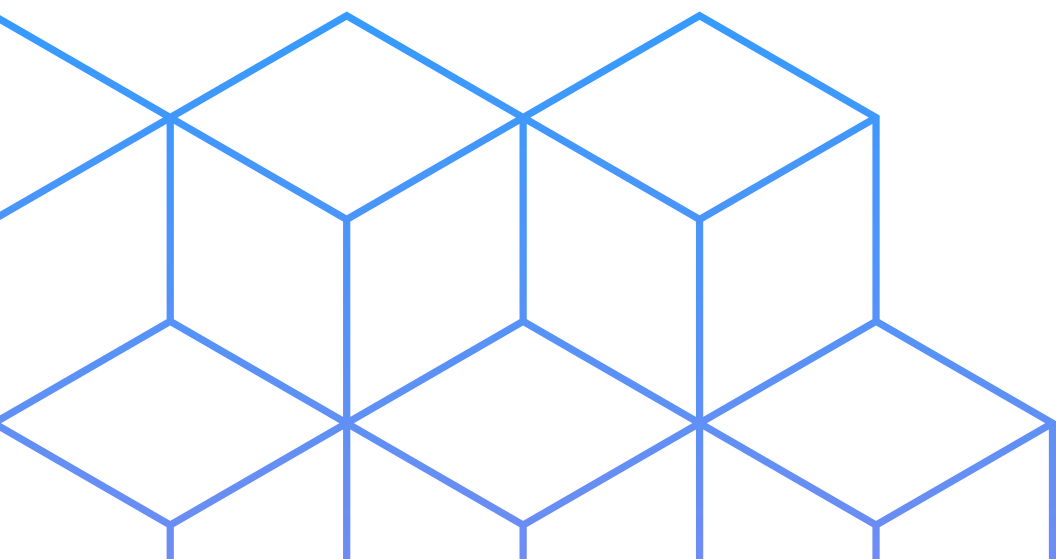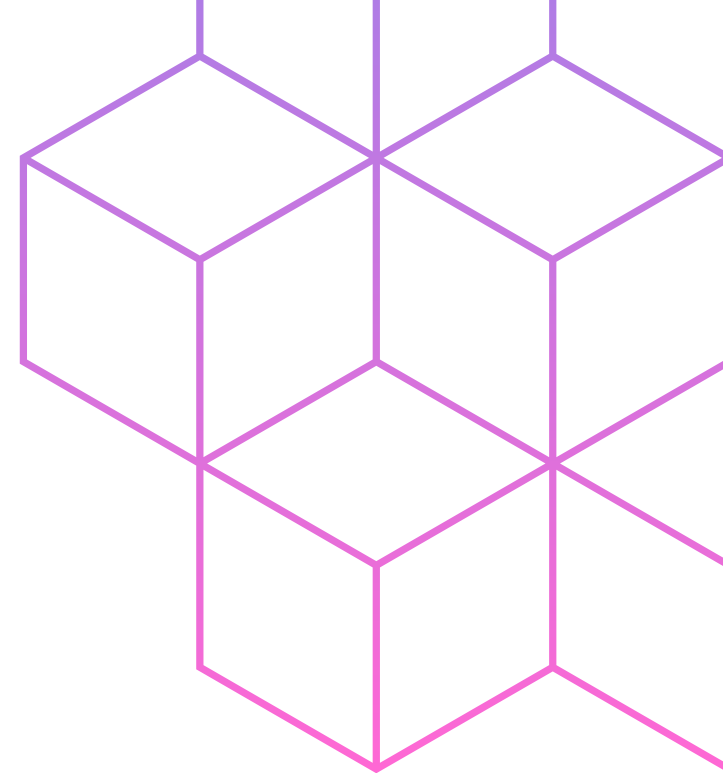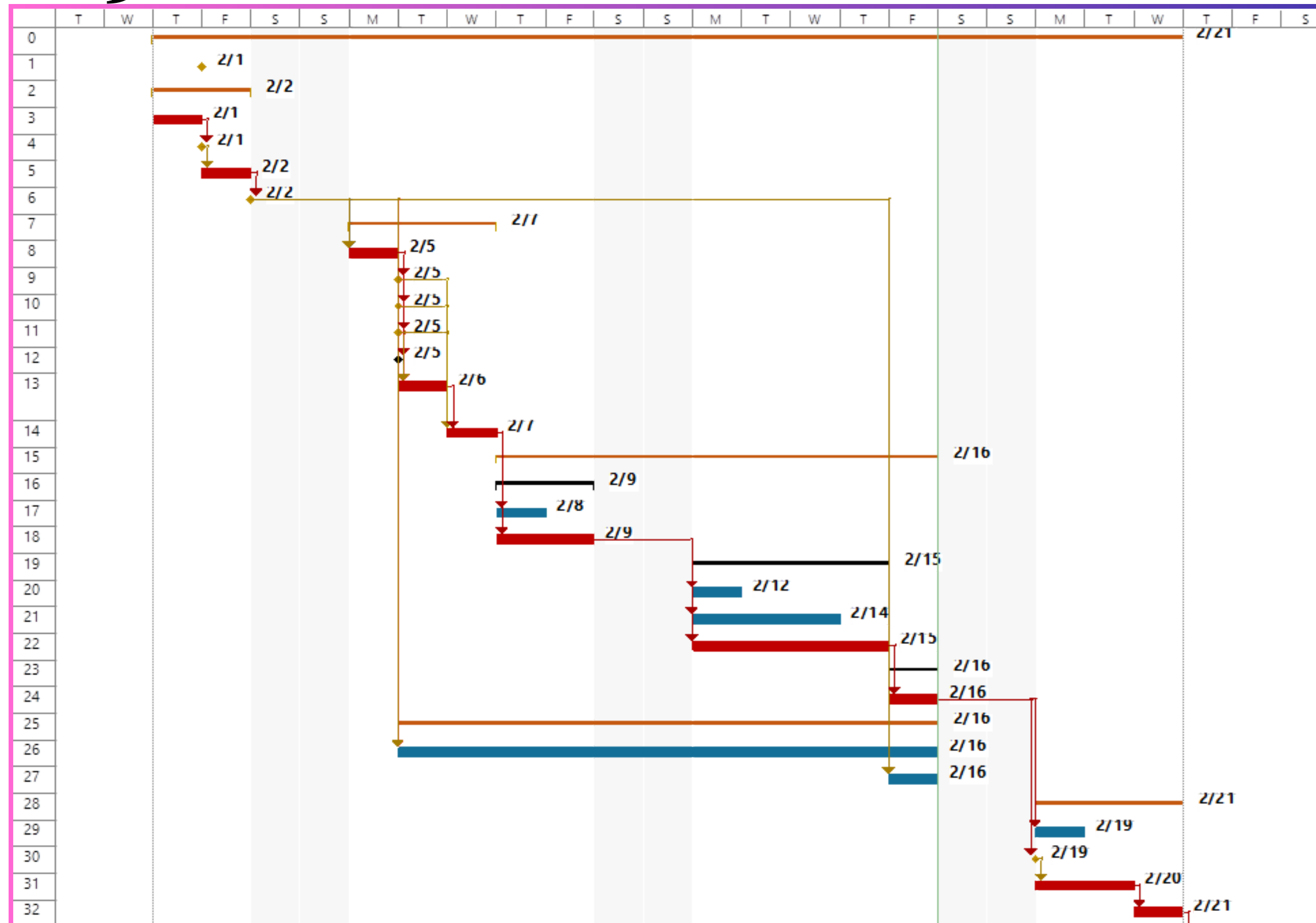
Appendix

MS Project
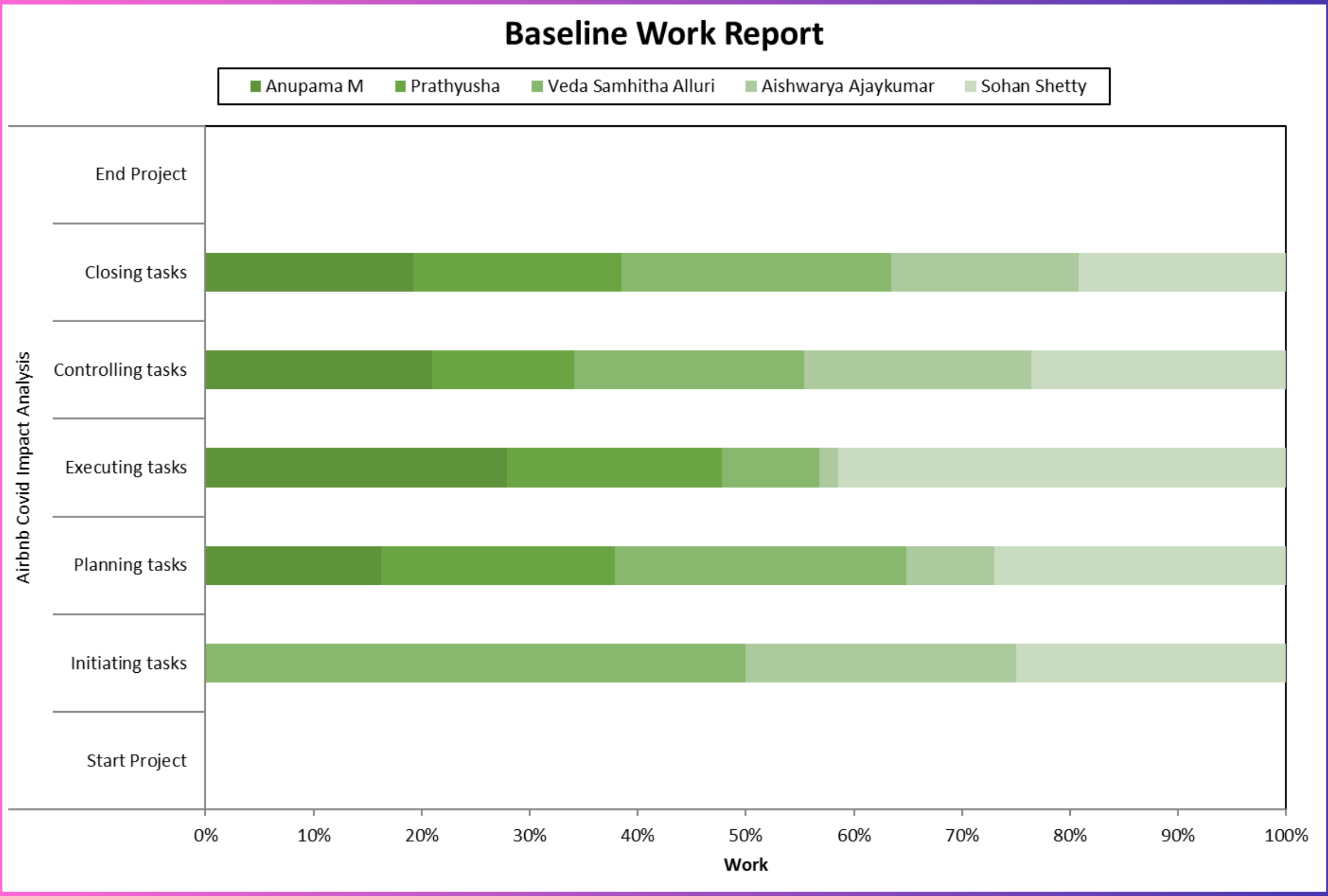
MS Project

Baseline Work Report

MS Project

Baseline Cost Report

Airbnb Covid Impact Analysis

Agile: Azure DevOps

	Order	Work Item Type	Title	State	Effort	Business Value	Value Area	Tags
	1	Epic	⌄ 👑 Airbnb Covid Impact Analysis	● Active			Business	
		Feature	⌄ 🏆 Initiating	● Closed			Business	
		User Story	> ▥ Project Scope Finalization	● Closed			Business	
		Feature	⌄ 🏆 Planning	● Closed			Business	
		User Story	> ▥ Create Project Plan in MS Project	● Closed			Business	
		User Story	⌄ ▥ Create Project Backlog in Azure DevOps ···	● Closed			Business	
		Task	📋 Define Epic, Features and User Stories	● Closed				
		Task	📋 Sprint Planning Facilitation	● Closed				
		Feature	⌄ 🏆 Executing	● Active			Business	
		User Story	> ▥ Feature Importance Analysis - Pre vs Post Pandemic	● In Progress			Business	
		User Story	> ▥ Predictive Modeling for Seattle data	● Closed			Business	
		User Story	> ▥ Predictive Modeling for New York data	● Closed			Business	
		User Story	> ▥ EDA Analysis for Airbnb and Covid dataset	● Closed			Business	
		User Story	> ▥ Data Cleaning and Preprocessing	● Closed			Business	
		User Story	> ▥ Data Acquisition	● Closed			Business	

Back

Agile: Azure DevOps

Results

Predicted Vs Actual values

Results

Predicted Vs Actual values

Results

Feature importance

New York

Feature	Importance
accommodates	9019200.0
calculated_host_listings_count	932432.802
calculated_host_listings_count_private_rooms	813406.309
number_of_reviews_ltm	586997.278
availability_30	516890.132
beds	378184.216
review_scores_location	362776.091
property_type	336927.552
reviews_per_month	301898.023
availability_60	260224.549
availability_365	258045.731
host_since	232593.052
review_scores_rating	160188.346
review_scores_value	141817.467
review_scores_cleanliness	129240.235
availability_90	89889.143
review_scores_accuracy	86506.761
host_listings_count	70341.798
minimum_maximum_nights	69498.981
review_scores_communication	62440.656

Back

Results

Feature importance

Seattle	
accommodates	94380050.56
beds	32059460.232
availability_365	14436013.580
reviews_per_month	13865497.410
minimum_maximum_nights	11699512.388
review_scores_cleanliness	11288025.505
property_type	9111053.537
host_since	8914122.341
review_scores_location	7641300.396
minimum_nights	7560046.941
host_neighbourhood	6959483.140
minimum_minimum_nights	6781710.904
number_of_reviews	5074333.699
availability_90	4719519.942
host_listings_count	4242335.123
review_scores_rating	4235440.352
availability_60	4229202.943
number_of_reviews_ltm	3981951.452
availability_30	3728049.087
minimum_nights_avg_ntm	3288580.788