Final Report:-

1. INTRODUCTION:-

1.1 Project Overview :-

This project aims to uncover insights from housing market data using Tableau. It focuses on analysing factors such as sale prices, renovation impact, and house features like bathrooms, bedrooms, and floors to assist real estate professionals in making data-driven decisions.

1.2 Purpose :-

To visualize and interpret housing trends using Tableau dashboards and stories, making it easier to explore the relationship between sale prices and house features for better decisionmaking.

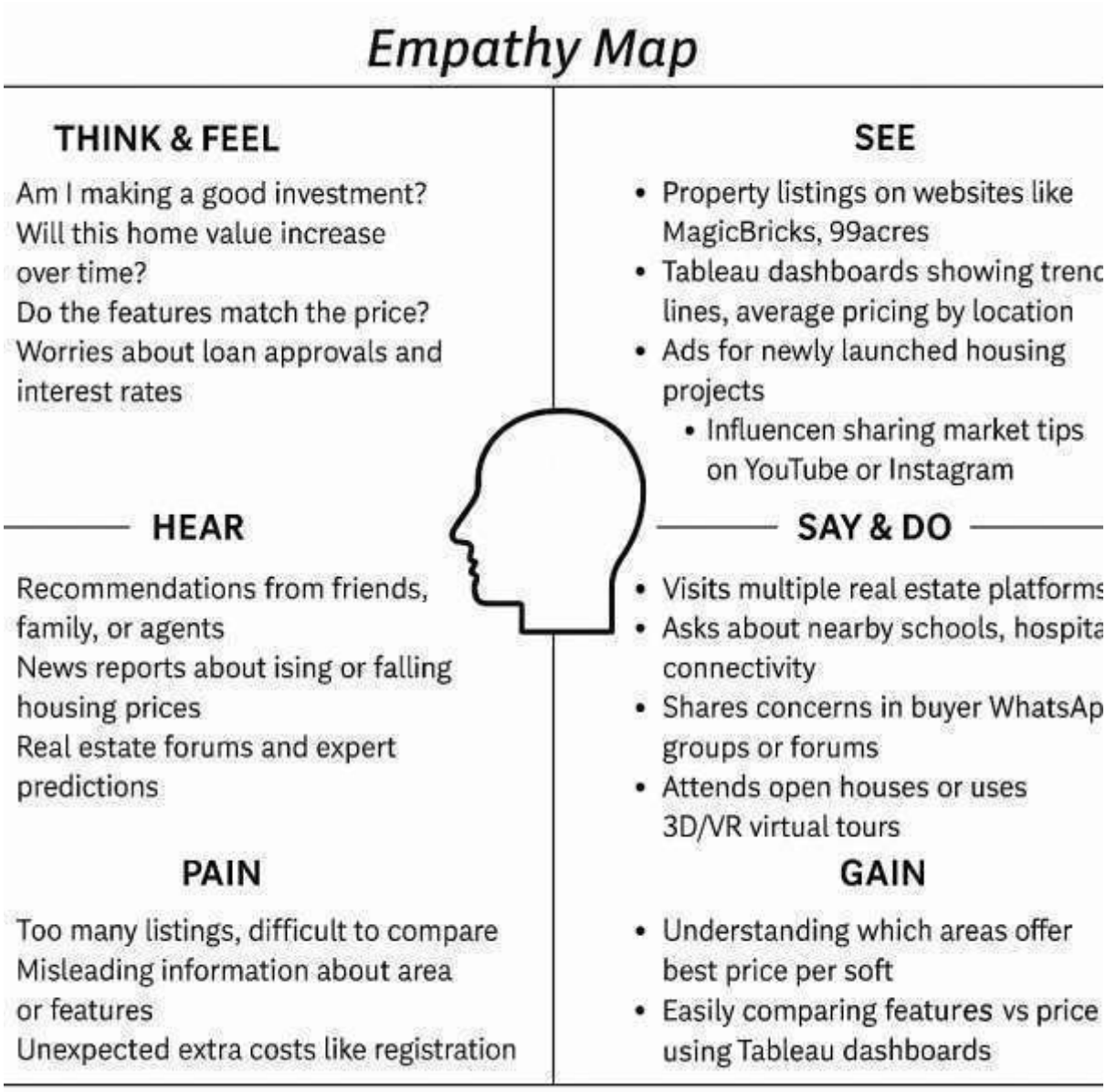
2. IDEATION PHASE:-

2.1 Problem Statement

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	a first-time home buyer	understand which areas offer affordable yet valuable homes	I can't compare home features like size, location, and price across regions easily	housing market data is scattered and not visually intuitive	overwhelmed and uncertain in making a purchase decision
PS-2	a real estate analyst	identify pricing trends and highgrowth investment areas	I can't quickly visualize patterns in sale prices and features across	raw data lacks interactive and comparative insights	frustrated and unsure about accurate forecasting

			cities or time		

2.2 Empathy Map Canvas:-



2.3 Brainstorming:-

Brainstorming – Project: Visualizing Housing Market Trends Using Tableau

Step 1:- Team Gathering, Collaboration and Problem Selection

Team Members:-Upendra Rao, Sai Sreenath, Veerendra

Problem:- Understanding the impact of house features and renovation on sale prices using visualizations in Tableau.

Step 2: Brainstorming, Idea Listing and Grouping:-

Idea	Group
Show avg sale price, total homes, area	Data Overview

Compare sales price by renovation	Renovation Impact
Use pie chart for age + renovation	Renovation Impact
Group age by bedrooms/bathrooms/floors	Feature Analysis
Add filters for better interaction	interactivity
Publish dashboard to Tableau Public	Deployment

Step 3: Idea Prioritization:-

Idea	Feasibility	Impact	Priority
Renovation vs Price Chart	High	High	High
House features by age	High	High	High
Pie chart for renovation status	Medium	Medium	Medium
KPI indicators	High	Medium	High
Filters on dashboard	Medium	High	High
Tableu Public link	High	Medium	Medium

3. REQUIREMENT ANALYSIS:-

3.1 Customer Journey map

SNO	Perspective	Discover	Explore & Compare	Analyse Insights	Decide &Act	Reflect &Reuse
1	**Goals & Motivations**	Help me find reliable, visual housing market data.	Help me find reliable, visual housing market data.	Help me find patterns, trends, and high-growth areas.	Help me make a confident buying or investment decision	Help me revisit and track areas I'm interested in
2	**Actions/Interactions**	Searching online for dashboards or price trend tools	Filtering by location, price, home size, time	Analyzing price heatmaps, comparing multiple neighborhoods	Exporting or saving visuals; shortlisting areas or properties	Returning to the dashboard, setting alerts, or exporting data
3	**Touch Points**	Google search, housing blogs, YouTube explainer videos	Tableau dashboard interface; dropdown filters, charts	Time-series graphs, regional comparison dashboards, scatter plots	Export/download buttons, note-taking tools, top-5 list feature	Email alerts, saved dashboards, revisit bookmarks
4	**Positive Moments**	Finding a well-designed dashboard or overview video	Easy comparison of two cities or house types	Discovering an undervalued area with rising prices	Feeling empowered to shortlist or pitch to investors	Seeing saved trends or confirming their prior assumptions
5	**Pain Points**	Overwhelmed by scattered or outdated data sources	Dashboard too complex for first-time users; too many filters	Charts hard to interpret; lack of clear insight summaries	Analysis paralysis: afraid of choosing the wrong area	No reminders or saved state; forced to redo filters
6	**Opportunity's**	Create a clean landing page with one-click access to visuals	Add presets like "Affordable cities" or "Top ROI areas"	Include narrative summaries: "This area grew 10% in last 6 months"	Build a recommendation engine or "Decision Helper" widget	Allow account login to save preferences; enable area tracking & alerts

3.2 Solution Requirement

Functional Requirements:-

Following are the functional requirements of the proposed solution.

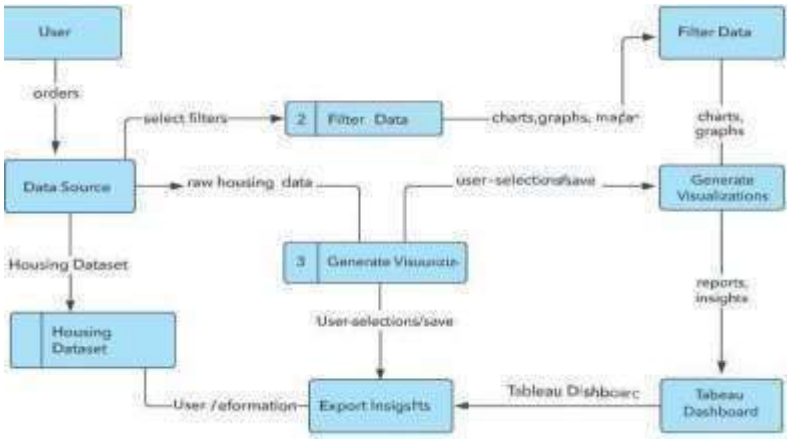
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Import	Load housing dataset from Excel or CSV
FR-2	Filtering & Interaction	Filter by city, price range, property size
FR-3	Visualization Generation	Display bar charts, line graphs, heatmaps
FR-4	Comparison Feature	Allow comparison of multiple cities/areas
FR-5	Export/Download	Enable export of visuals to PDF or image
FR-6	Saved View	Allow saving filter settings for later reuse

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement (Epic)	Description
NFR-1	Usability	The dashboard should be intuitive and easy to use for non-technical users
NFR-2	Security	User data (if any) must be handled securely; access via Tableau Public
NFR-3	Reliability	The system should be available 99% of the time
NFR-4	Performance	Visualization should load within 3 seconds
NFR-5	Availability	Dashboard should be accessible 24/7 via the published tableau link
NFR-6	Scalability	Should handle increased data size

3.3 Data Flow Diagram



User Stories:-

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Home Buyer	View Listings and Prices	USN-1	As a home buyer, I want to filter listings by city and price rang	I can see relevant houses only for my budget	High	Sprint-1
Home Buyer	Visual Comparison	USN-2	As a home buyer, I want to compare house prices across cities	I can see a chart comparing at least 2 cities	High	Sprint-1
Real Estate Analyst	Analyze Trends	USN-3	As an analyst, I want to see price trends	I can view a line graph of historical price trends	High	Sprint-2

			over time for a region			
Real Estate Analyst	Export Data	USN-4	As an analyst, I want to export visual insights into a PDF	I can download visuals as a PDF	Medium	Sprint-2
Home Buyer / Analyst	Access Saved View	USN-5	As a user, I want to save and return to my filtered dashboard later	I can return and see my previously saved filters	LOW	Sprint-3

3.4 Technology Stack

Technical Architecture:-

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

S.No	Component	Description	Technology
1	User Interface	Web-based dashboard view	Tableau Public
2	Application Logic-1	Data filtering and user interaction	Tableau filters and parameters
3	Application Logic-2	Data visualization logic	Tableau dashboards & calculated fields
4	Application Logic-3	Not used (optional)	—

5	Database	Housing dataset (CSV)	Excel / CSV
6	Cloud Database	Hosted data files	Google Drive / Tableau Public
7	File Storage	Source file storage	Local system / Google Drive
8	External API-1	(Optional) Live pricing data API	RapidAPI (if used)
9	External API-2	(Optional) Geolocation or Maps API	Google Maps API (if used)
10	Machine Learning Model	Not used	—
11	Infrastructure (Server / Cloud)	Tableau hosted online	Tableau Public

Table-2: Application Characteristics:-

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Uses Tableau Public (free) and data from Kaggle or open housing sources	Tableau Public, Excel
2	Security Implementations	Tableau's built-in privacy and publishing settings	Tableau Privacy Settings

3	Scalable Architecture	Can scale to visualize larger datasets or additional regions	Tableau filters, cloud storage
4	Availability	Hosted 24/7 on Tableau Public	Tableau Public
5	Performance	Optimized dashboard design, fast filters, small file size	Tableau filters, preaggregated data

4. PROJECT DESIGN:-

4.1Problem Solution Fit

Problem Solution Fit Problem – Solution Fit Template:-

Problem – Solution Fit

Target Customer

- First-time home buyers - Real estate analysts

Problems

- Housing data is scattered across many websites
- Difficult to compare features like price, size, and location
- Raw data isn't visually intuitive
- Analysts can't easily spot trends across time or regions

Existing Alternatives

- Using Excel sheets and raw CSV files
- Checking multiple property listing websites manually
- Watching YouTube videos for housing advice - Relying on outdated or static graphs

Your Solution

- A centralized, interactive Tableau dashboard
- Ability to filter housing data by city, price, size, and more
- Visualize trends using bar charts, heatmaps, and time-series graphs - Compare multiple cities or neighborhoods side-by-side

Key Benefits

- Simplifies decision-making for home buyers
- Saves time for analysts by visualizing trends instantly
- Reduces confusion by using clear, interactive visuals - Offers exportable reports for offline review

Unique Value Proposition (UVP)

- Unlike raw data or static websites, this dashboard combines real estate insights, filters, and visual clarity in one place.
- It's user-friendly, built on Tableau, and customized to users' goals (whether buying or analyzing).

Purpose:-

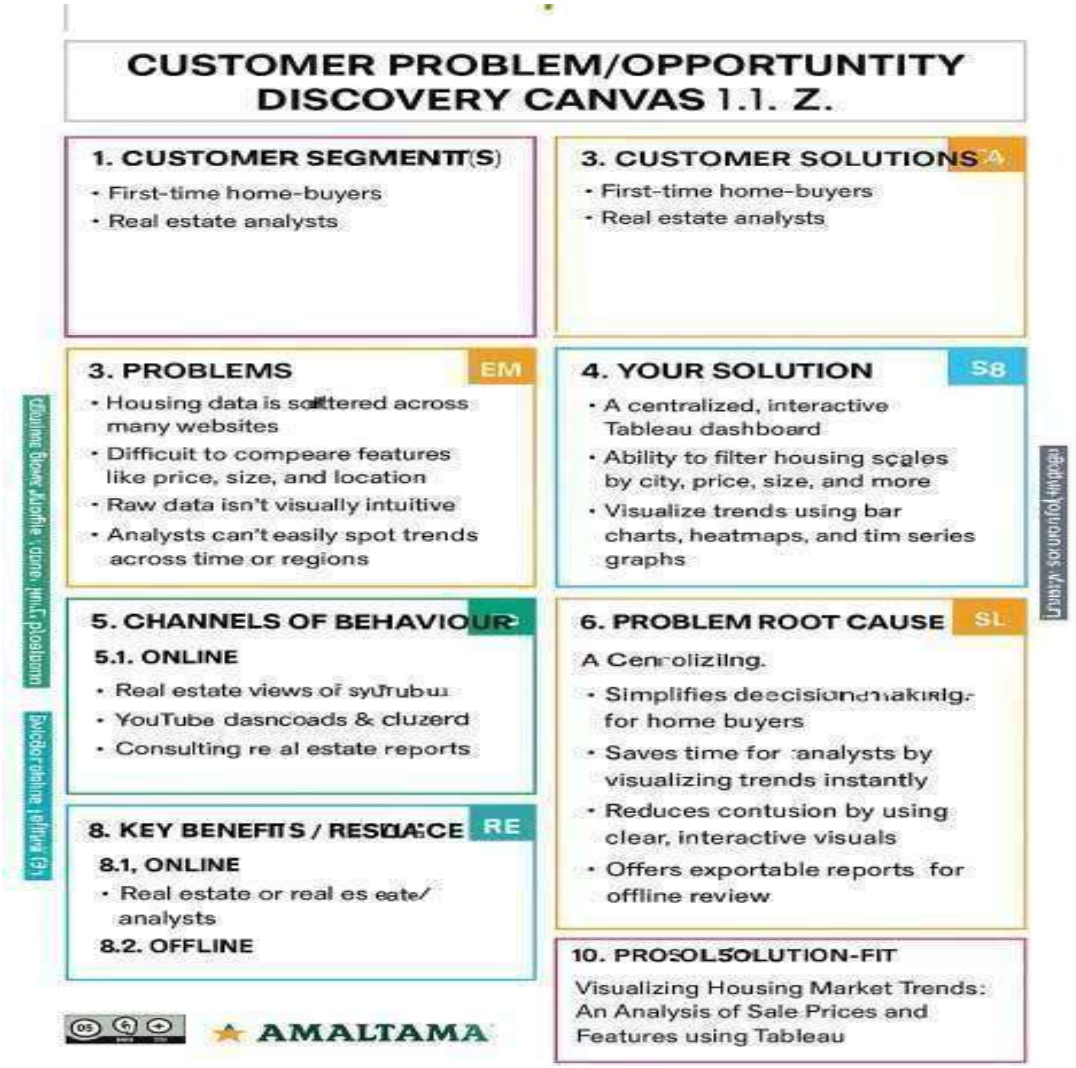
❑ Solve complex problems in a way that fits the state of your customers.

❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging. ❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.

❑ Understand the existing situation in order to improve it for your target group.

Template:-



4.1 Proposed Solution

Proposed Solution Template:-

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	Housing market data is often scattered, difficult to compare, and lacks intuitive visual representation. This makes it hard for home buyers and analysts to identify trends, understand key influencing factors, and make data-driven decisions.
2	Idea / Solution description	Our solution is a Tableau-based dashboard that visually represents

		housing market trends using a dataset containing housing sales, renovation status, house age, number of bedrooms, bathrooms, floors, and basement area. It enables users to: • Analyze total sales by years since renovation • View house age distributions • Compare features like bathrooms, bedrooms, and floors • Identify pricing trends using clear, interactive visuals This empowers real estate analysts, marketing teams, and decision-makers with actionable insights.
3	Novelty / Uniqueness	Unlike traditional spreadsheets or static reports, this dashboard provides an interactive, filterable, and visual representation of housing data. It brings together renovation impact, age analysis, and feature-based comparison — all in one place — built with minimal tools (only Tableau and open datasets), making it accessible and scalable.
4	Social Impact / Customer Satisfaction	This project improves the home-buying process by offering clarity and confidence in decisionmaking for first-time buyers. Analysts save time interpreting raw data. Stakeholders gain deeper insights to develop better marketing, pricing, and investment strategies — increasing satisfaction and trust.
5	Business Model (Revenue Model)	This can be offered as a premium analytics solution to real estate firms or consultancy services. Additional revenue can be generated through: • Subscription access to dashboards • Custom insights for clients

		• Integration with company websites to attract leads
6	Scalability of the Solution	The solution is highly scalable: • New datasets (e.g., from other regions or years) can be added easily • Additional filters and visualizations can be implemented without rewriting the logic It can support multiple use cases like rental trends, commercial real estate, etc.

4.2 Solution Architecture:-

Solution Architecture:-

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Key Aspects:-

Business Problem:-

Stakeholders such as real estate analysts and executives struggle to interpret scattered housing market data. There's a need for a centralized tool to visualize and analyze house prices, renovation effects, and property characteristics**.**

Technology Solution:-

The solution uses Tableau to create an interactive dashboard built from a structured housing dataset (e.g., Kaggle's train.csv). Users can analyze renovation impacts, age distribution, and other features through visual filters and charts**.**

Features:-

- Visualization of sales by renovation age
- Distribution analysis by bathrooms, bedrooms, floors
- Age comparison between renovated and non-renovated houses
- Exportable insights

Solution Delivery: -

- Tableau Public Dashboard
- Published with open-source CSV dataset
- Shared via URL + Screenshots

Example - Solution Architecture Diagram:-

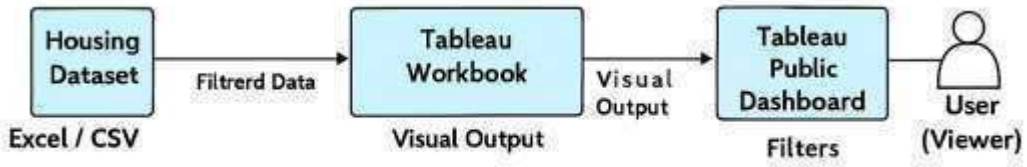


Figure 1: Solution Architecture for Housing Market Visualization using Tableau

5. PROJECT PLANNING & SCHEDULING:-

5.1 Project Planning

Product Backlog, Sprint, Schedule & Estimation(4 marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Connection & Cleaning	USN-1	As a user, I want to import and clean the housing dataset in Tableau	3	High	Upendra Rao, Sai Sreenath
Sprint-1	Filter Setup	USN-2	As a user, I want to filter data by city, price, bedrooms, etc. in the dashboard	2	High	Upendra Rao, Veerendra
Sprint-2	Visualize Trends	USN-3	As an analyst, I want to visualize total sales by years since	3	High	Upendra Rao

			renovation			
Sprint-2	Comparative Views	USN-4	As a user, I want to compare house ages based on bathrooms, bedrooms, and floors	3	Medium	Sai Sreenath
Sprint-3	Dashboard Layout	USN-5	As a user, I want to interact with a clear, clean dashboard layout	2	High	Upendra Rao
Sprint-3	Export Features	USN-6	As a user, I want to export visuals or summary reports from the dashboard	2	Medium	Veerendra
Sprint-4	Testing & Optimization	USN-7	As a team, we want to test dashboard loading and refine visual filters	2	High	Whole Team
Sprint-4	Tableau Public	USN-8	As a user, I want the	1	High	Upendra Rao

	Deployment		dashboard to be published to Tableau Public with a share link			

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	5	2 Days	20 June 2025	21 June 2025	5	21 June 2025
Sprint-2	5	1 Day	22 June 2025	22 June 2025	5	22 June 2025
Sprint-3	5	1 Day	23 June 2025	23 June 2025	5	23 June 2025
Sprint-4	5	1 Day	24 June 2025	24 June 2025	5	24 June 2025
Sprint-5	5	1 Day	25 June 2025	25June 2025	5	25 June 2025

Velocity:-

Average Velocity = 25 / 6 = 4.166... ≈ 4.2 story points/day

Burndown Chart:-

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

6. FUNCTIONAL AND PERFORMANCE TESTING:-

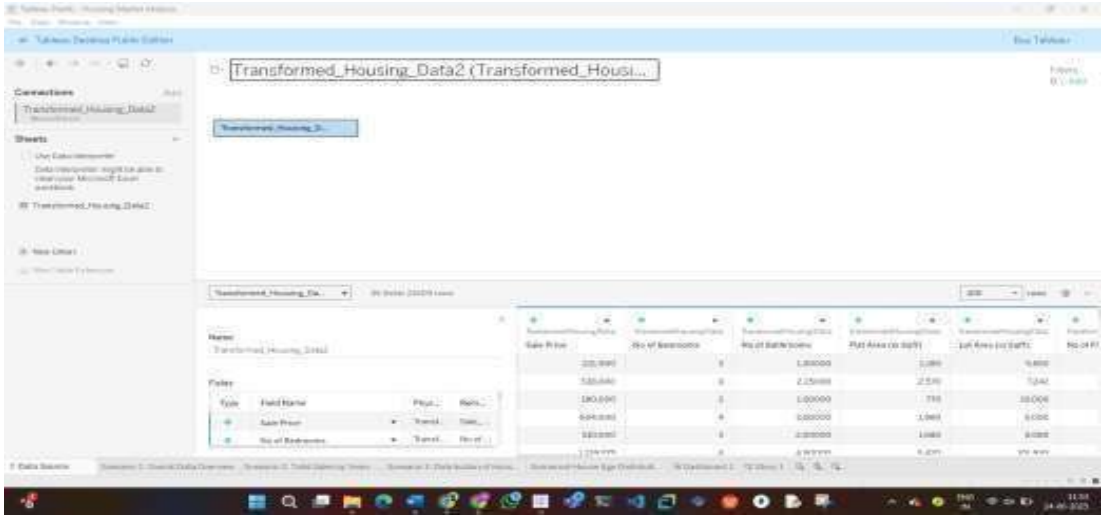
6.1 Performance Testing:-

Model Performance Testing:-

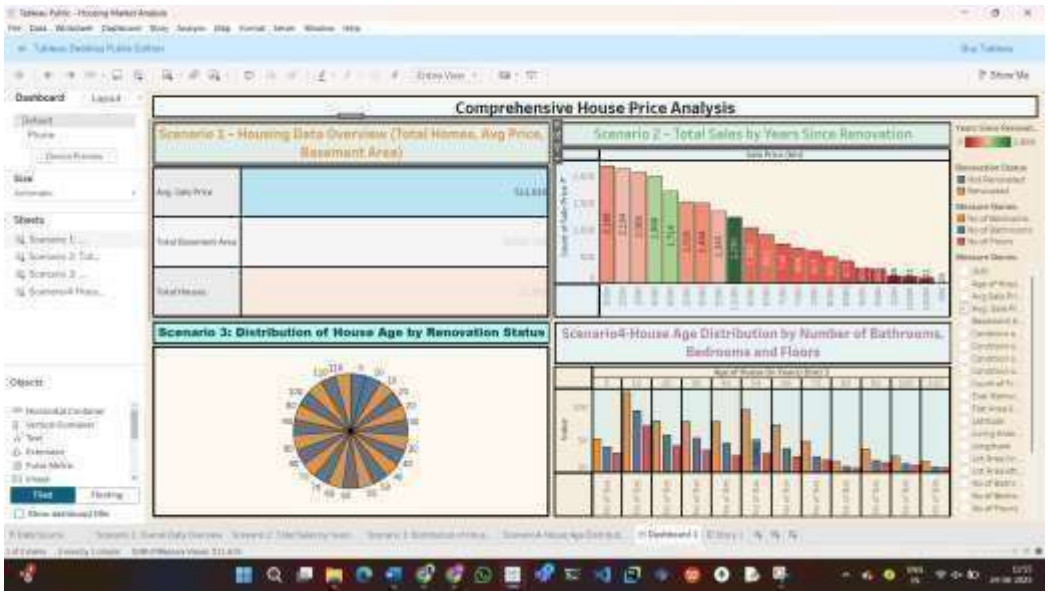
Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1	Data Rendered	• Total Rows: 21,609 • Columns: 36 • File used: Transformed_Housing_Data2.xlsx ○ Rendered from Tableau Data Source tab (attach screenshot
2	Data Preprocessing	○ Converted CSV to Excel format ○ Renamed field names for readability (e.g., Sale Price,years Since Renovation) ○ Created calculated field Renovation Status
3	Utilization of Filters	○ Filters applied to: ○ Years Since Renovation ○ No. of Bedrooms, Bathrooms, Floors ○ Filters are shown on dashboard and individual sheets
4	Calculation fields Used	○ ears Since Renovation (if not provided) ○ Age of House (in Years) (calculated from Year Built and current year) ○ Renovation Status (custom calc for Yes/No)
5	Dashboard design	○ No of Visualizations / Graphs – 4 ○ Scenario 1: Overall Data Overview ○ Scenario 2: Bar chart by renovation years ○ Scenario 3: Pie chart for age/renovation ○ Scenario 4: Grouped bar chart for house features
6	Story Design	• **No of Visualizations / Graphs – 4** • - - Story includes 3 scenario charts

Screenshot of Data Source:-

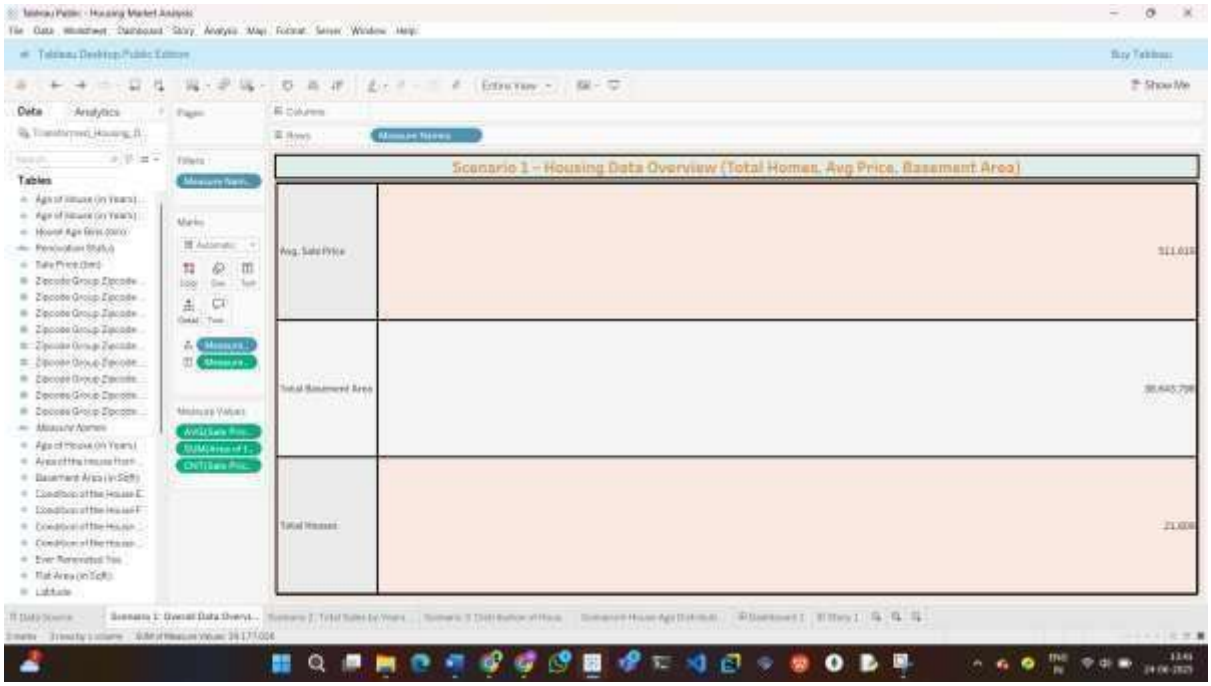


Screenshot of Dashboard with Filters:-

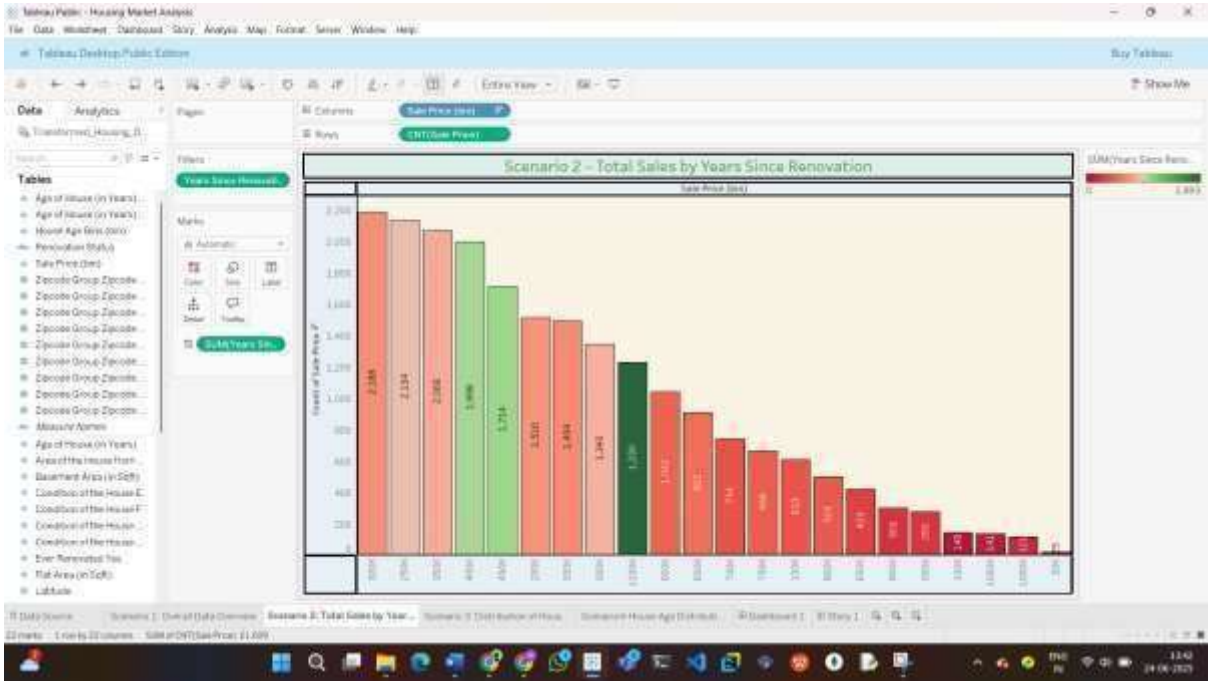


7. RESULTS

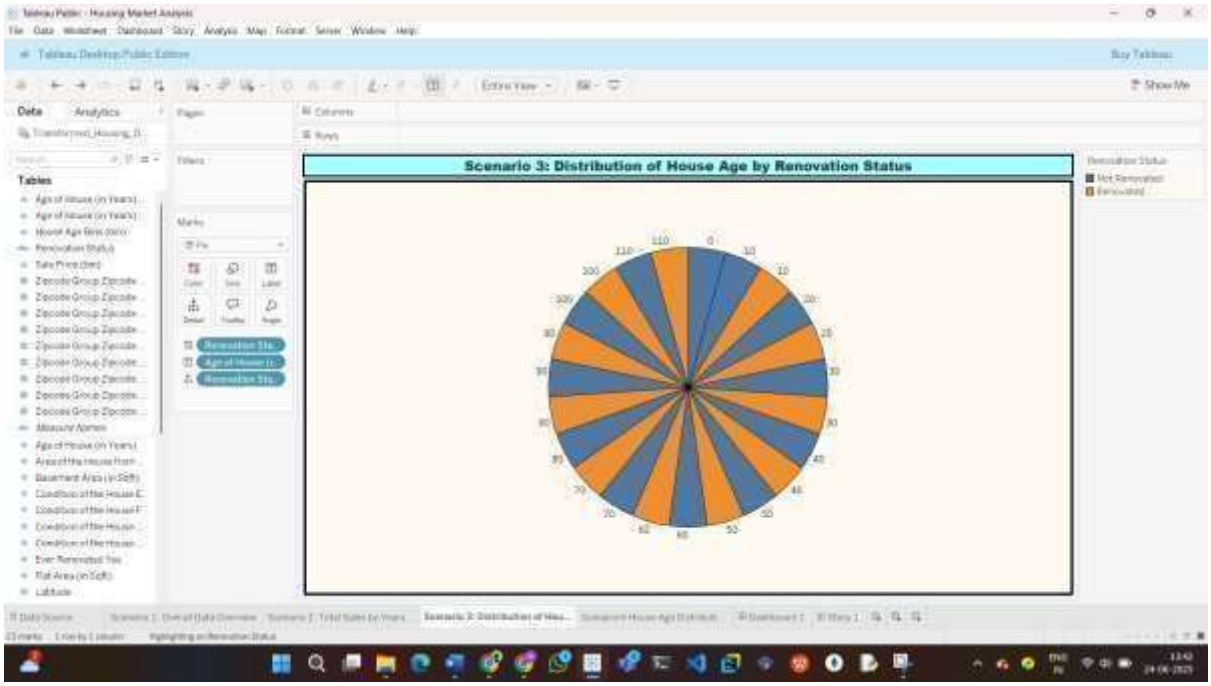
7.1 Output Screenshots :- Scenario 1: Overall Data Overview



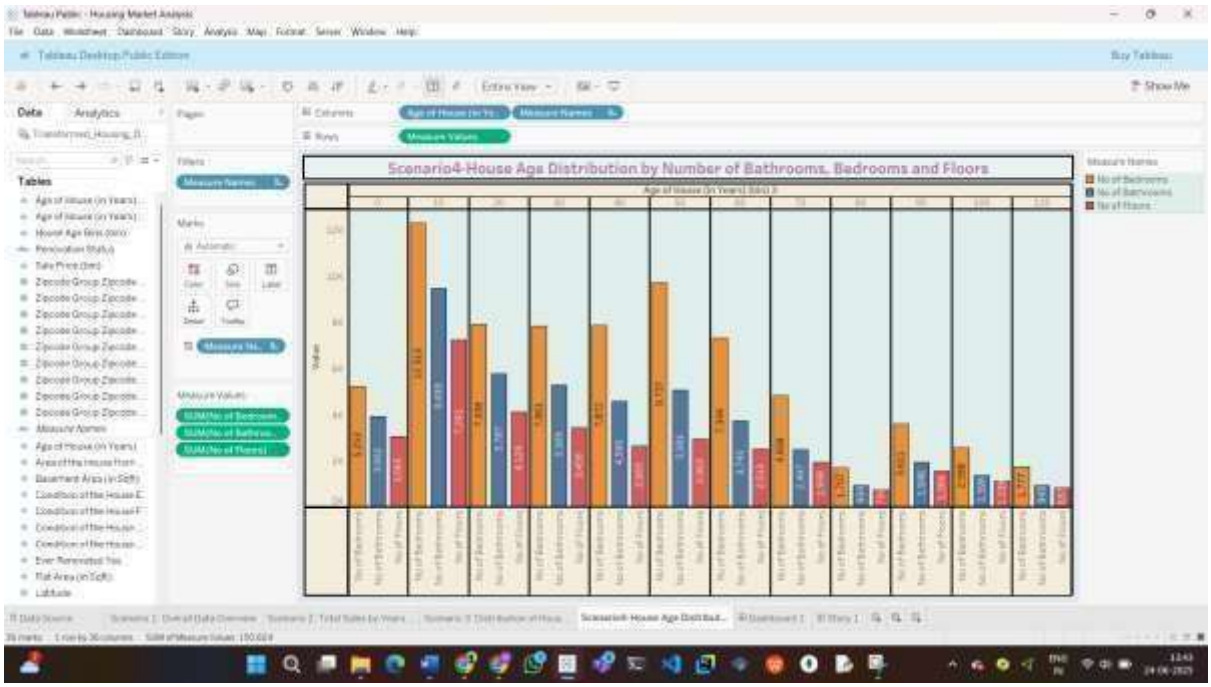
Scenario 2: Total Sales by Years Since Renovation2



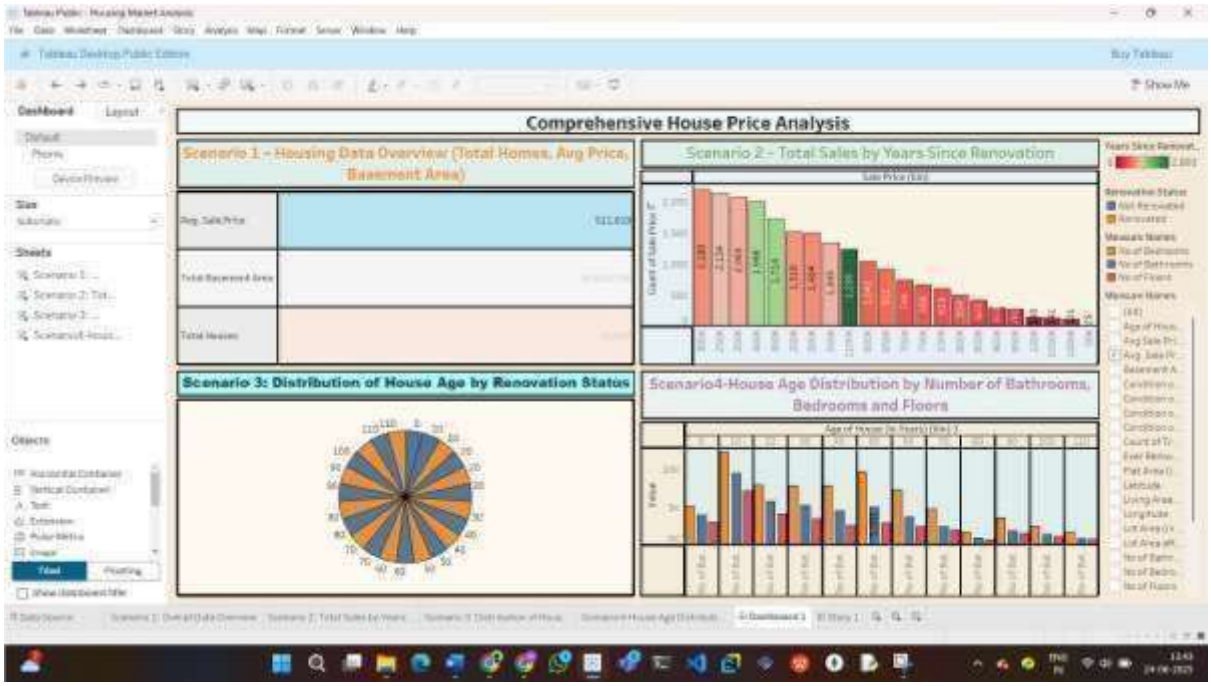
Scenario 3: Distribution of House Age by Renovation Status



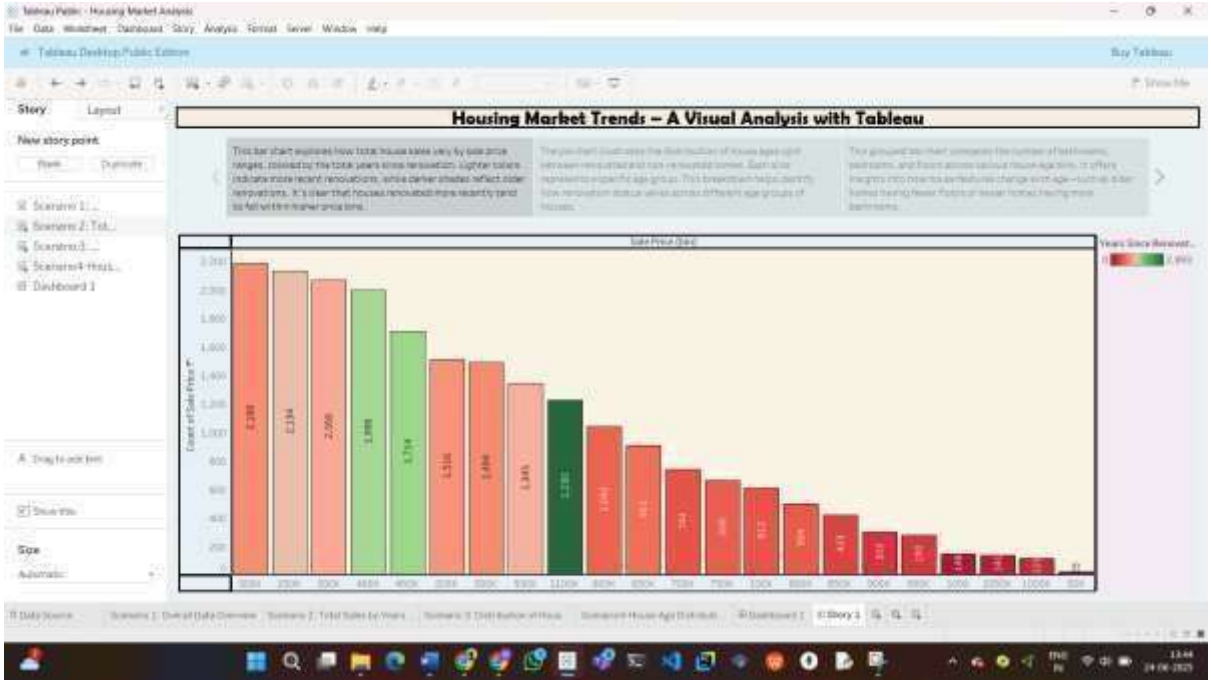
Scenario4-House Age Distribution by Number of Bathrooms, Bedrooms and Floors

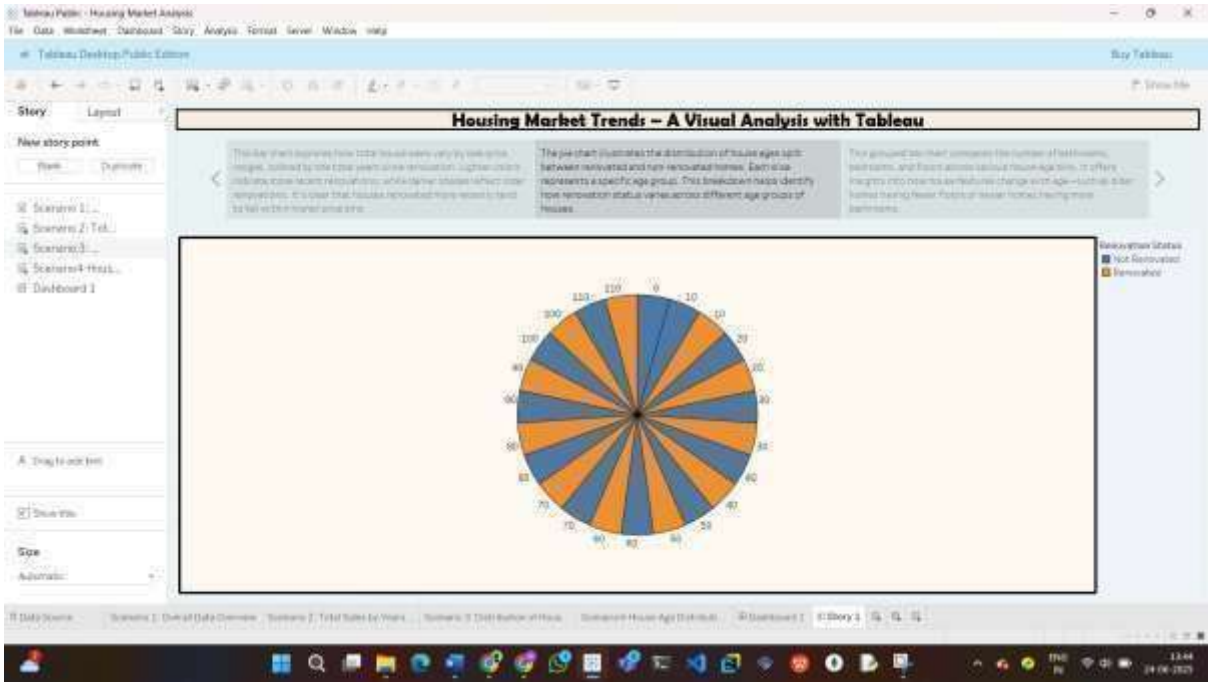


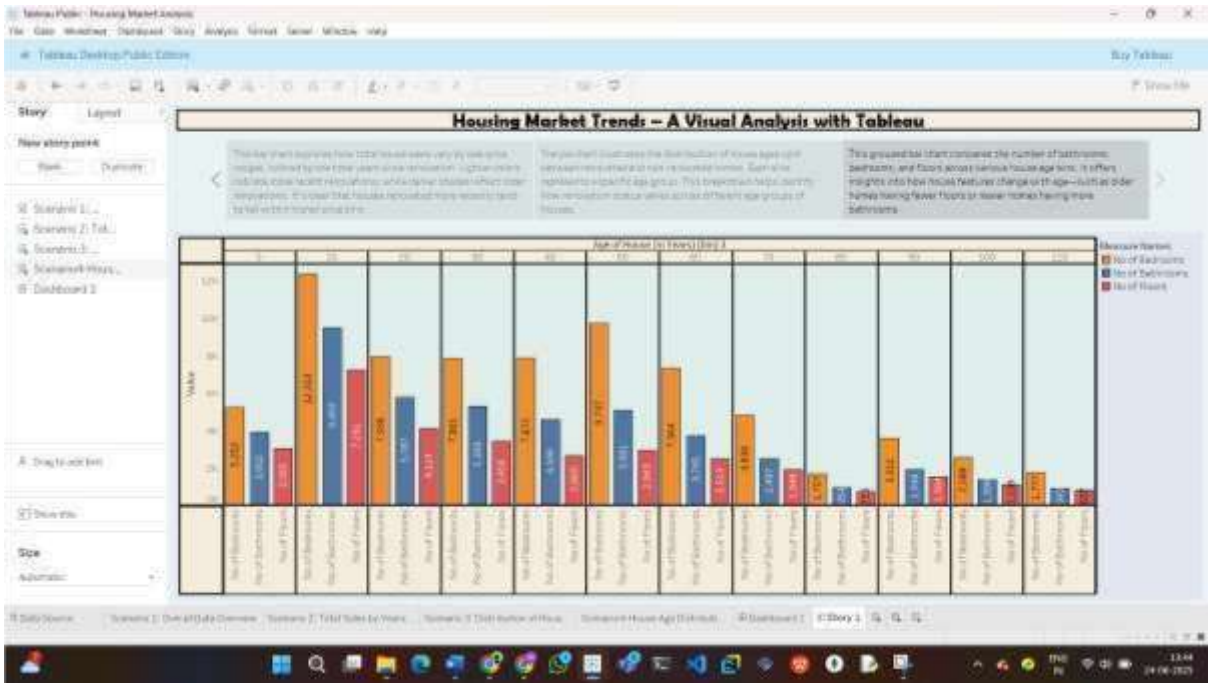
Dashboard 1:-


Comprehensive House Price Analysis
Scenario 1 – Housing Data Overview (Total Homes, Avg Price, Basement Area)
Scenario 2 – Total Sales by Years Since Renovation
Scenario 3: Distribution of House Age by Renovation Status
Scenario4-House Age Distribution by Number of Bathrooms, Bedrooms and Floors

Story 1:-


Housing Market Trends – A Visual Analysis with Tableau





8 **ADVANTAGES & DISADVANTAGES:-**

Advantages:

- Visualizes complex housing data easily
- Helps analysts and buyers make quicker decisions
- Saves time through interactivity and filters

Disadvantages:

- Limited to available dataset features
- Real-time data updates not automated in Tableau Public

9 CONCLUSION:-

This project successfully analyzed housing market trends using Tableau. Visualizations highlighted how renovation years, house age, and property features impact sale price and buyer decisions. 10

FUTURE SCOPE:-

- Add real-time data integration
- Use predictive models for price forecasting
- Expand to include location-based insights (geographic dashboards)

11. APPENDIX :-

- **Source Code:-** N/A (Tableau is low-code)
- **Dataset Link:-** https://www.kaggle.com/datasets/rituparnaghosh18/transformedhousin gdata-2

- **GitHub & Project Demo Link:-**
- **Git hub Link:-**
- https://github.com/Upendra072/Visualizing-Housing-Market-Trends-An-Analysis-of-Sale-Prices-and-Features-using-Tableau

- **Project Video Demo Link:-**
- https://drive.google.com/file/d/1lPXElpT-OPvYfy3R_xuovO7OW_YWoHoO/view?usp=sharing