real_estate_market_analysis

April 9, 2025

1 Real Estate Market Performance Analysis - Dubai (2023 vs 2024)

Objectives: To analyze and compare Dubai's real estate market performance between the years 2023 and 2024, focusing on price trends, listing volume, and regional pricing insights

Dataset Source:
Dubai Real Estate Sales Insights - Kaggle
https://www.kaggle.com/datasets/azharsaleem/dubai-real-estate-sales-insights

Reason for Exclusion of 2021 and 2022 from the dataset: Data for years 2021 and 2022 is limited (only 2 and 69 records respectively), with skewed outliers. These years are excluded to ensure data reliability.

Key KPIs: - Average Property Price - Price per SqFt - Listings Trend Over Time - Property Type Distribution - Price by Location - Completion Status vs Price

1.1 Importing Libraries

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from datetime import datetime
```

1.2 Import the Dateset

[2]:
```
df = pd.read_csv('data/dubai_real_estate_sales.csv')

# View some data from dataset to ensure proper import of the dataset
df.head()
```

[2]:
```
     price price_category       type  beds  baths  \
0  1450000         Medium  Apartment     1      2
1  6600000           High  Townhouse     5      5
2  4825000           High  Apartment     2      3
3   980000        Average  Apartment     3      3
4  2499999         Medium  Townhouse     3      4
```

```
                                             address   furnishing  \
0                        The Bay, Business Bay, Dubai    Furnished
1                      Brookfield, DAMAC Hills, Dubai  Unfurnished
2     Vida Residence Downtown, Downtown Dubai, Dubai  Unfurnished
3  Building 39, Al Reef Downtown, Al Reef, Abu Dhabi  Unfurnished
4                             Nima, The Valley, Dubai    Furnished

  completion_status   post_date  average_rent  … total_parking_spaces  \
0             Ready  2024-04-15             0  …                    0
1             Ready  2024-04-15             0  …                    0
2             Ready  2024-04-18        288929  …                  510
3             Ready  2024-01-03         73384  …                    0
4          Off-Plan  2024-02-28             0  …                    0

   total_floors  total_building_area_sqft  elevators       area_name  \
0             0                         0          0    Business Bay
1             0                         0          0     DAMAC Hills
2            56                         1         11  Downtown Dubai
3             0                         0          0         Al Reef
4             0                         0          0      The Valley

        city country   Latitude  Longitude   purpose
0      Dubai     UAE  25.189427  55.264819  For Sale
1      Dubai     UAE  25.028148  55.264246  For Sale
2      Dubai     UAE  25.186684  55.274705  For Sale
3  Abu Dhabi     UAE  24.466437  54.656891  For Sale
4      Dubai     UAE  25.019221  55.447201  For Sale

[5 rows x 22 columns]
```

1.3 Data Cleaning & Transformation

1.3.1 Check Basic Info

[3]:
```
# Check Dataset Info
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 41381 entries, 0 to 41380
Data columns (total 22 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   price                     41381 non-null  int64
 1   price_category            41381 non-null  object
 2   type                      41381 non-null  object
 3   beds                      41381 non-null  int64
 4   baths                     41381 non-null  int64
 5   address                   41381 non-null  object
 6   furnishing                 41381 non-null  object
 7   completion_status          41381 non-null  object
 8   post_date                  41381 non-null  object
 9   average_rent               41381 non-null  int64
 10  building_name              41381 non-null  object
 11  year_of_completion         41381 non-null  int64
 12  total_parking_spaces       41381 non-null  int64
 13  total_floors               41381 non-null  int64
 14  total_building_area_sqft   41381 non-null  int64
 15  elevators                  41381 non-null  int64
 16  area_name                  41381 non-null  object
 17  city                       41381 non-null  object
 18  country                    41381 non-null  object
 19  Latitude                   41363 non-null  float64
 20  Longitude                  41363 non-null  float64
 21  purpose                    41381 non-null  object
dtypes: float64(2), int64(9), object(11)
memory usage: 6.9+ MB
```

1.3.2 Convert Date column

[9]:

```
df['post_date'] = pd.to_datetime(df['post_date'], errors='coerce')
```

1.3.3 Drop Rows with missing price or location data (essential for proper analysis)

[67]:

```
# Selecting the columns where we want to drop the missing data from
df = df.dropna(subset=['price', 'city', 'Latitude', 'Longitude', 'type'])
```

1.3.4 Drop Rows with City other than Dubai

[68]:

```
df = df[df['city'] == 'Dubai']
```

1.3.5 Proper formatting for Price Column

[69]:

```
df.loc[:, 'price'] = pd.to_numeric(df['price'], errors='coerce',␣
 ↪downcast='integer')
```

1.3.6 Create Month and Year Columns

[70]:

```
# Ensure the post_date column is in datetime format before extracting year and␣
 ↪month
df.loc[:, 'year'] = df['post_date'].dt.year
df.loc[:, 'month'] = df['post_date'].dt.month
```

1.3.7 Filter the Dataset for the required years, i.e 2023 and 2024

[71]:

```
df = df[df['year'].isin([2023, 2024])]
```

1.3.8 Create Price/SqFT if area available

[72]:

```
# Multiply Price x Area
df.loc[: ,'price_per_sqft'] = df['price'] / df['total_building_area_sqft']

# Remove incorrect data to NaN
df.loc[:, 'price_per_sqft'] = df['price_per_sqft'].replace([np.inf, -np.inf],␣
 ↪np.nan)
```

1.4 Exploratory Data Analysis (EDA)

1.4.1 Average Price by year

[73]:

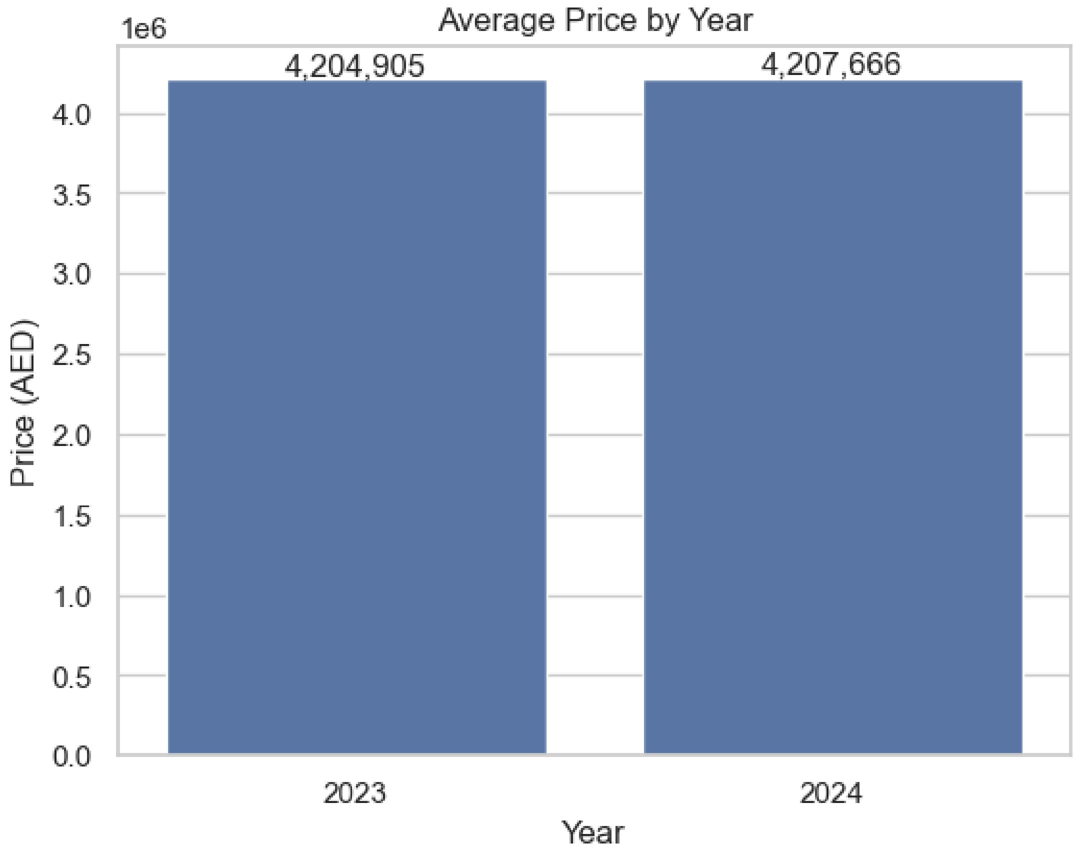
```
avg_price = df.groupby('year')['price'].mean().reset_index()

# Setting the Theme for the plots
sns.set(style="whitegrid")

# Create a function to format numbers with commas and no decimals
def format_price(x):
    return f"{int(x):,}"

# Create the formatted labels beforehand
formatted_prices = [format_price(price) for price in avg_price['price']]

ax = sns.barplot(data=avg_price, x='year', y='price')
ax.bar_label(ax.containers[0], labels=formatted_prices)
plt.title("Average Price by Year")
plt.xlabel("Year")
plt.ylabel("Price (AED)")
plt.show()
```

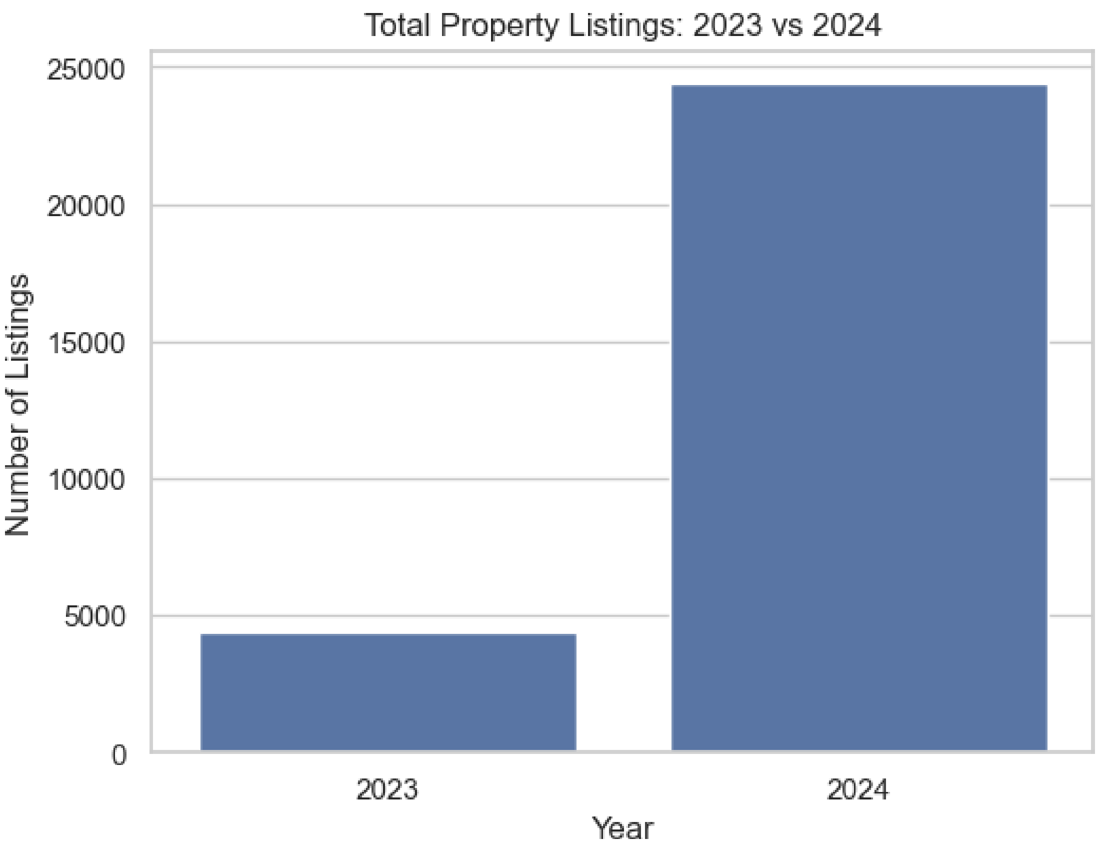


1.4.2 Listings Volume by Year

[74]:

```
listings_by_year = df.groupby('year').size().reset_index(name='count')

sns.barplot(data=listings_by_year, x='year', y='count')
plt.title("Total Property Listings: 2023 vs 2024")
plt.ylabel("Number of Listings")
plt.xlabel("Year")
plt.show()
```



1.4.3 Top 10 Areas by Avg Price (Per Year)

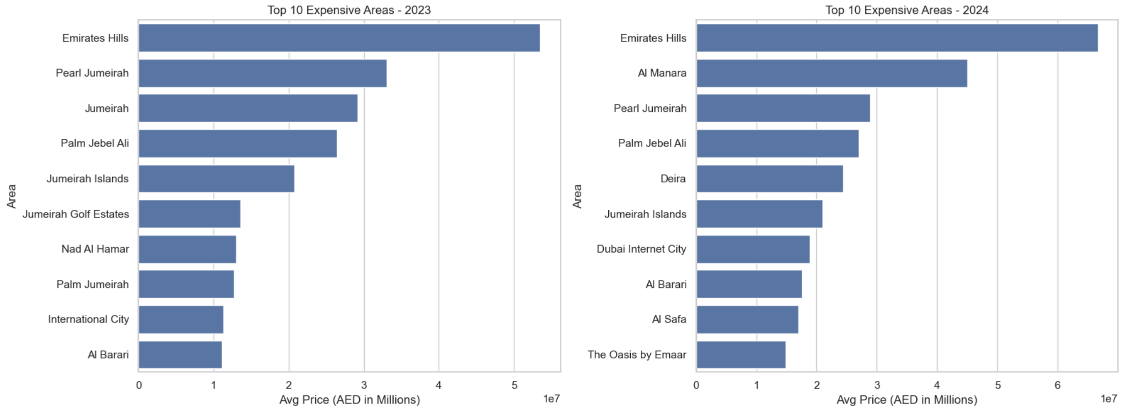
[75]:
```python
top_areas = df.groupby(['year', 'area_name'])['price'].mean().reset_index()
top_areas = top_areas.sort_values(['year', 'price'], ascending=[True, False])

# Pick top 10 areas for each year
top_2023 = top_areas[top_areas['year'] == 2023].head(10)
top_2024 = top_areas[top_areas['year'] == 2024].head(10)

fig, axes = plt.subplots(1, 2, figsize=(16, 6))
sns.barplot(data=top_2023, x='price', y='area_name', ax=axes[0])
axes[0].set_title("Top 10 Expensive Areas - 2023")
axes[0].set_xlabel("Avg Price (AED in Millions)")
axes[0].set_ylabel("Area")

sns.barplot(data=top_2024, x='price', y='area_name', ax=axes[1])
axes[1].set_title("Top 10 Expensive Areas - 2024")
axes[1].set_xlabel("Avg Price (AED in Millions)")
axes[1].set_ylabel("Area")
```

```
plt.tight_layout()
plt.show()
```



1.4.4 Property Type Share Comparison

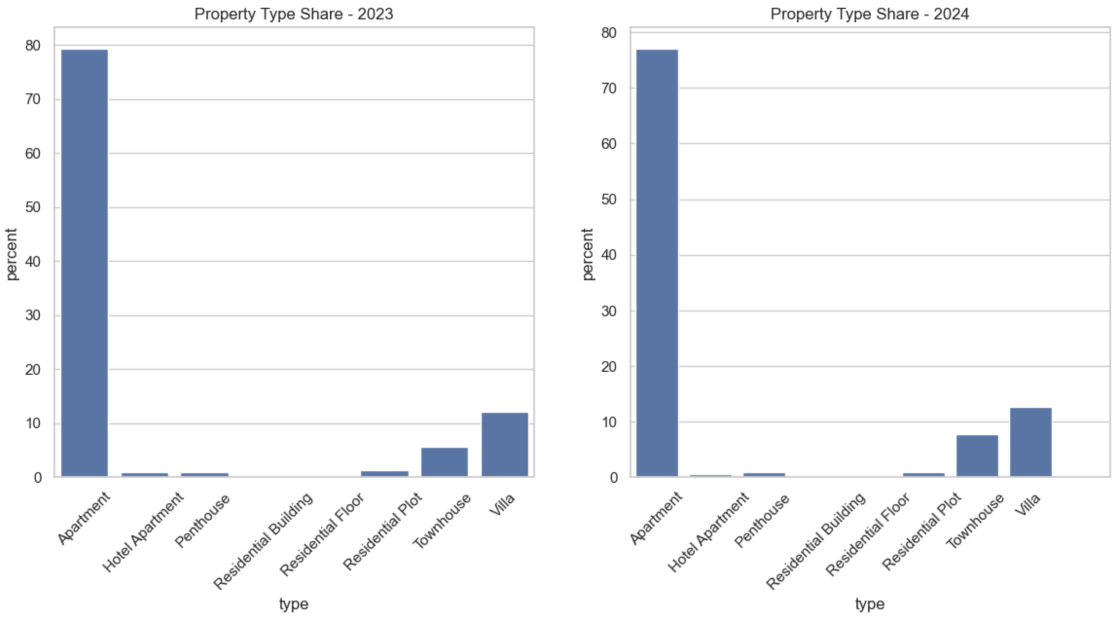
[80]:
```
type_share = df.groupby(['year', 'type']).size().reset_index(name='count')
type_share['percent'] = type_share.groupby('year')['count'].transform(lambda x:␣
  ↪x / x.sum() * 100)

# Plot for 2023 vs 2024
fig, ax = plt.subplots(1, 2, figsize=(14, 6))
sns.barplot(data=type_share[type_share['year'] == 2023], x='type', y='percent',␣
  ↪ax=ax[0])
ax[0].set_title("Property Type Share - 2023")
ax[0].set_xticklabels(ax[0].get_xticklabels(), rotation=45)

sns.barplot(data=type_share[type_share['year'] == 2024], x='type', y='percent',␣
  ↪ax=ax[1])
ax[1].set_title("Property Type Share - 2024")
ax[1].set_xticklabels(ax[0].get_xticklabels(), rotation=45)
```

```
C:\Users\adnan\AppData\Local\Temp\ipykernel_18708\2780309638.py:8: UserWarning:
set_ticklabels() should only be used with a fixed number of ticks, i.e. after
set_ticks() or using a FixedLocator.
  ax[0].set_xticklabels(ax[0].get_xticklabels(), rotation=45)
C:\Users\adnan\AppData\Local\Temp\ipykernel_18708\2780309638.py:12: UserWarning:
set_ticklabels() should only be used with a fixed number of ticks, i.e. after
set_ticks() or using a FixedLocator.
  ax[1].set_xticklabels(ax[0].get_xticklabels(), rotation=45)
```

```
[80]: [Text(0, 0, 'Apartment'),
       Text(1, 0, 'Hotel Apartment'),
       Text(2, 0, 'Penthouse'),
       Text(3, 0, 'Residential Building'),
       Text(4, 0, 'Residential Floor'),
       Text(5, 0, 'Residential Plot'),
       Text(6, 0, 'Townhouse'),
       Text(7, 0, 'Villa'),
       Text(8, 0, '')]
```



2 Key Insights:

- The average property price remained stable from 2023 to 2024 (~4.2M AED), with a slight increase in luxury listings.
- Listings volume increased significantly in 2024, especially in high-end areas.
- Area-wise price rankings changed — with new areas entering the top 10 in 2024.
- Apartment share dropped slightly in 2024 as villa and townhome listings increased.

This comparison reveals changing demand and supply patterns in Dubai's property market post-COVID.

```
[ ]:
```