T8D1 Discussion

```
# Import Libraries
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import statsmodels.api as sm
from statsmodels.formula.api import ols

# Import housing price dataset
data = pd.read_csv('housing.csv')

# Select only numeric columns
numeric_data = data.select_dtypes(include=[int, float])

# Calculate the means for each neighborhood
neighborhood_means = data.groupby('Neighborhood')['SalePrice'].mean().reset_index()

# Calculate the correlation matrix
correlation_matrix = numeric_data.corr()

# Print the beginning of the data
print(data.head())

# Compute summary statistics for numerical variables
summary_stats = data.describe()

# Print the summary statistics
print("Summary Statistics:")
print(summary_stats)

# Create a heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, cmap="coolwarm", fmt=".2f")
plt.title("Correlation Heatmap")
plt.show()
```

```python
# Create box plots to visualize price distribution by neighborhood
plt.figure(figsize=(12, 6))
sns.boxplot(x='Neighborhood', y='SalePrice', data=data)
plt.title('Housing Prices by Neighborhood')
plt.xlabel('Neighborhood')
plt.ylabel('Sale Price')
plt.xticks(rotation=45)  # Rotate x-axis labels for readability

# Add mean values to the box plots
for i, mean_price in enumerate(neighborhood_means['SalePrice']):
    plt.text(i, mean_price, f'Mean: ${mean_price:.2f}', ha='center', va='bottom')

plt.show()

# Perform ANOVA to test for differences in housing prices among neighborhoods
model = ols('SalePrice ~ Neighborhood', data=data).fit()
anova_table = sm.stats.anova_lm(model, typ=2)

# Print the ANOVA table
print("ANOVA Table:")
print(anova_table)
```

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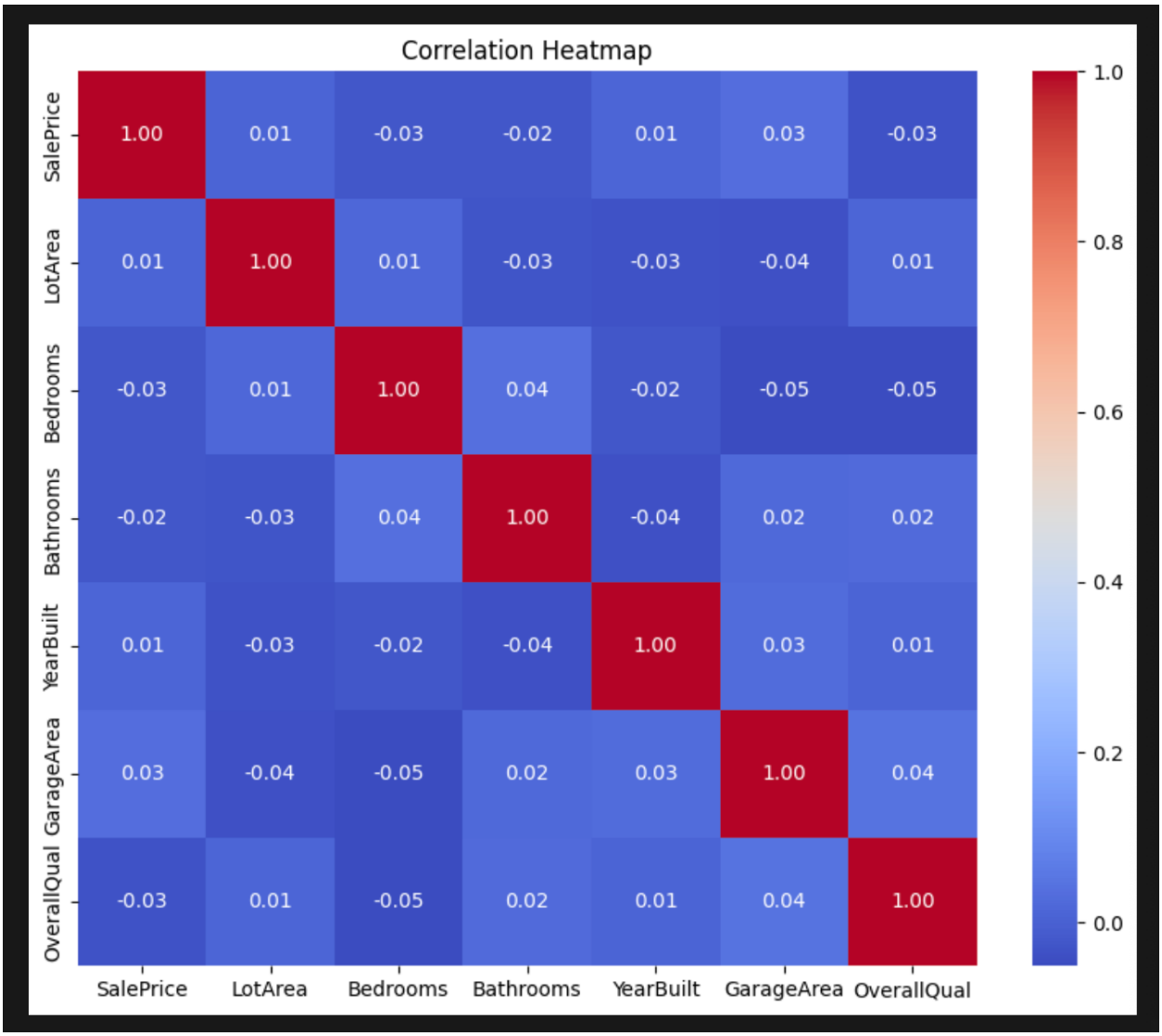
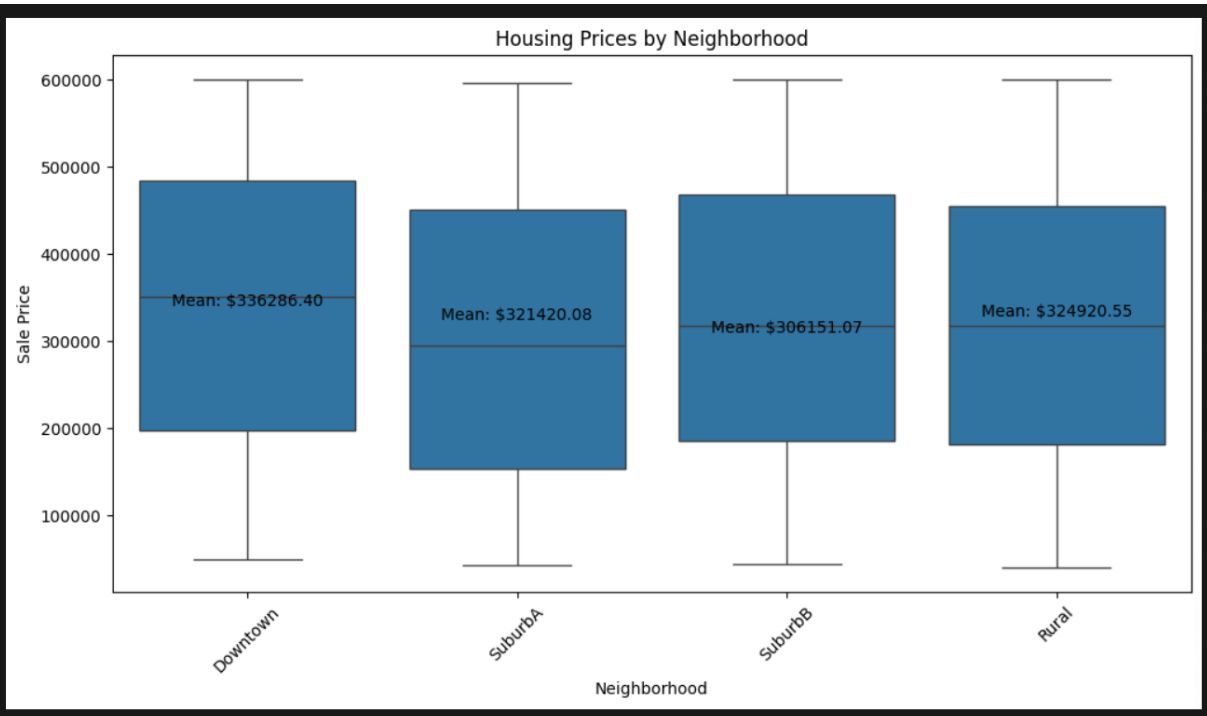
	SalePrice	LotArea	Bedrooms	Bathrooms	Neighborhood	YearBuilt	\
0	444779.85	22452	1	1.100043	Downtown	1951	
1	266432.37	23674	6	4.568718	SuburbA	1995	
2	452819.42	4570	2	1.930644	SuburbA	1991	
3	126971.70	8723	4	3.357063	SuburbA	2017	
4	467272.51	12649	3	1.621918	Downtown	1933	

```
   GarageArea  OverallQual HeatingType
0         328            3         Gas
1         532            1         Gas
2         303            9        Wood
3         925            3        Wood
4         194            7         Gas
Summary Statistics:
           SalePrice       LotArea     Bedrooms    Bathrooms    YearBuilt  \
count    1000.000000   1000.000000  1000.000000  1000.000000  1000.000000
mean   322214.216550  13321.734000     3.640000     3.009127  1972.761000
std    162185.565024   6684.791449     1.692118     1.165516    30.096506
min     40778.130000   1506.000000     1.000000     1.000679  1920.000000
25%    179270.127500   7344.500000     2.000000     1.975159  1946.000000
50%    319734.390000  13643.500000     4.000000     2.993038  1974.000000
75%    462176.635000  19058.000000     5.000000     4.030405  1998.000000
max    599870.620000  24989.000000     6.000000     4.998288  2025.000000

        GarageArea  OverallQual
...
25%     309.000000     3.000000
50%     551.000000     6.000000
75%     775.000000     8.000000
max    1000.000000    10.000000
```


Correlation Heatmap
SalePrice
LotArea
Bedrooms
Bathrooms
YearBuilt
GarageArea
OverallQual
1.00 0.01 -0.03 -0.02 0.01 0.03 -0.03
0.01 1.00 0.01 -0.03 -0.03 -0.04 0.01
-0.03 0.01 1.00 0.04 -0.02 -0.05 -0.05
-0.02 -0.03 0.04 1.00 -0.04 0.02 0.02
0.01 -0.03 -0.02 -0.04 1.00 0.03 0.01
0.03 -0.04 -0.05 0.02 0.03 1.00 0.04
-0.03 0.01 -0.05 0.02 0.01 0.04 1.00
SalePrice
LotArea
Bedrooms
Bathrooms
YearBuilt
GarageArea
OverallQual
1.0
0.8
0.6
0.4
0.2
0.0



ANOVA Table:

	sum_sq	df	F	PR(>F)
Neighborhood	1.170017e+11	3.0	1.484835	0.217085
Residual	2.616085e+13	996.0	NaN	NaN

Interpretation:

ANOVA table suggests that there is no statistically significant difference in housing prices among different neighborhoods. Based on the p-value (PR(>F)) of 0.217, which is greater than the conventional significance level of 0.05

Summary:

The analysis indicates that neighborhood differrence do not account for statistically significant amount of variation in housing prices. Other factors, not included in the analysis, may have more substantial influence on sale prices.

Insight:

While Anova did not find significant differences in housing among neighborhoods, it is essential to consider various factor.

Also, we could use this as an example of how a housing price EDA works, however we could collect a real dataset to see if there is a statically significant difference between neighborhood and sales prices.

Additional research and data exploration are warranted to gain more comprehensive understanding of the determinants of house prices.

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