



Final Project Report

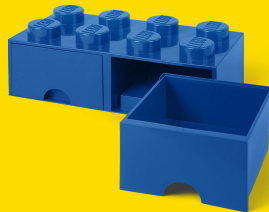


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IST 718
December 19, 2022

Specification



What problem are you attempting to solve?

Problem:

What Lego set should the company produce next?

Hypothesis:

Predicting which brick colors the next Lego sets should prioritize will aid future popularity and sales.

Data:

Rebrickable Lego database, containing inventory, including parts, sets, colors, from Kaggle.



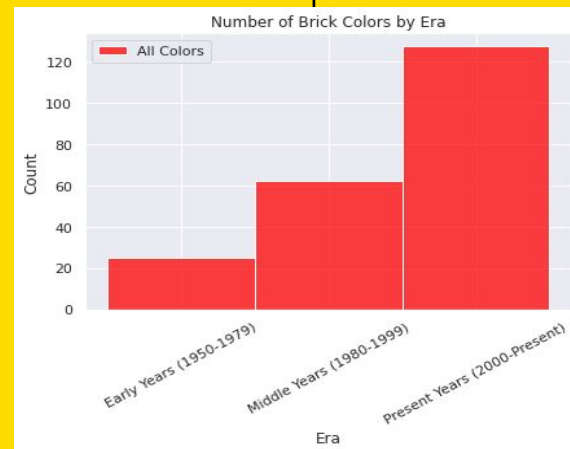
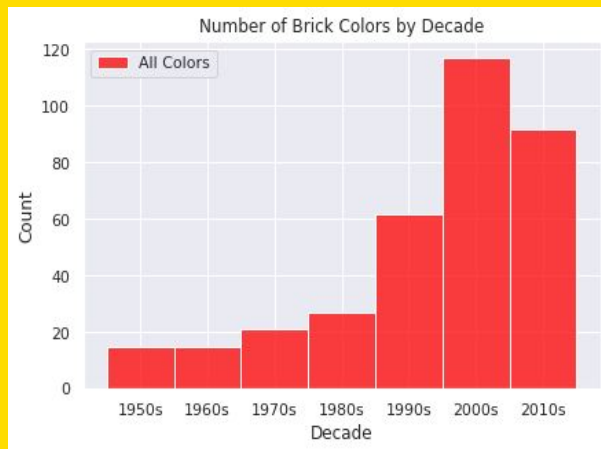
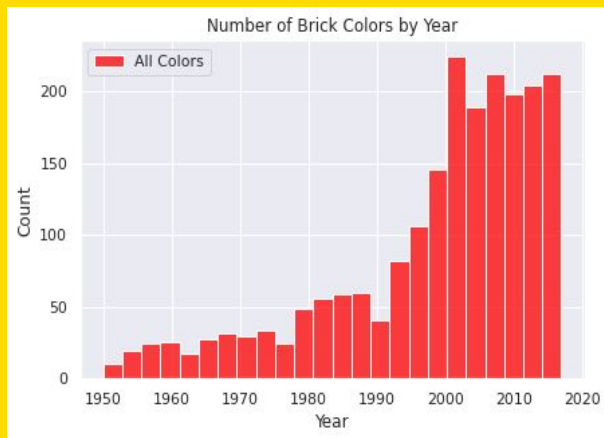
Specification

Data Frame	# Rows	# Columns
colors_df	135	4
inventories_df	11681	3
inventory_parts_df	580251	5
inventory_sets_df	2846	3
part_categories_df	57	2
parts_df	25993	3
sets_df	11673	5
themes_df	614	3



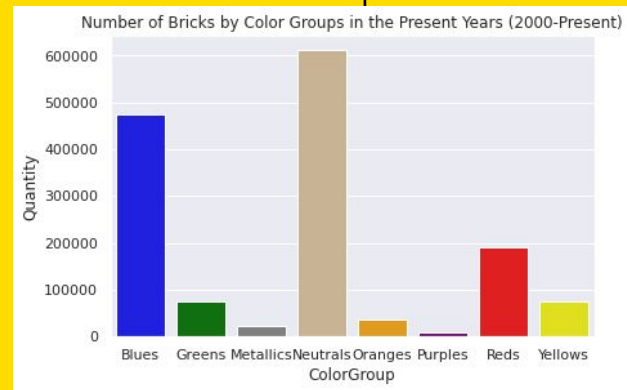
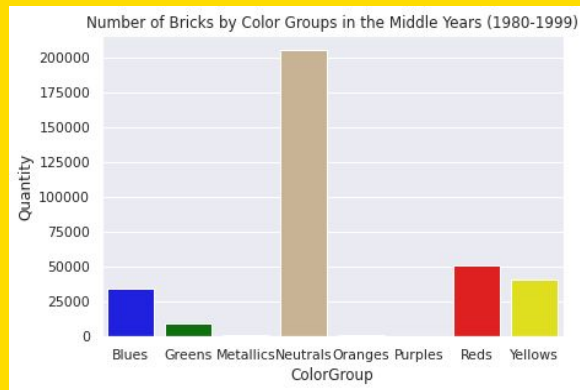
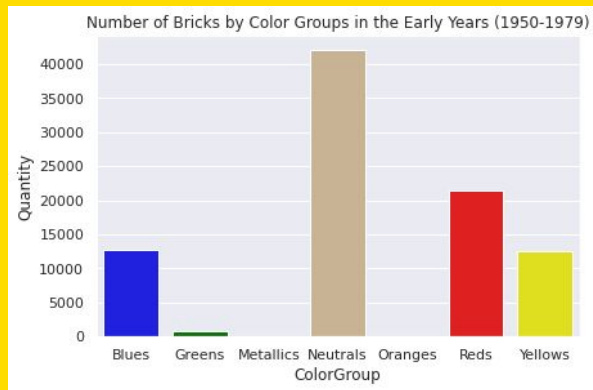
Observation

Quantity of Brick Colors Over Time

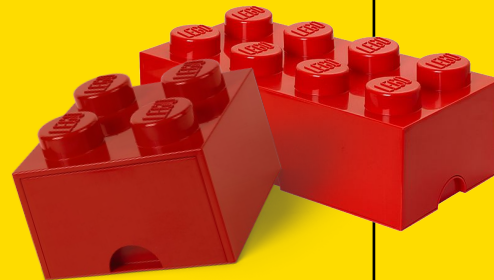
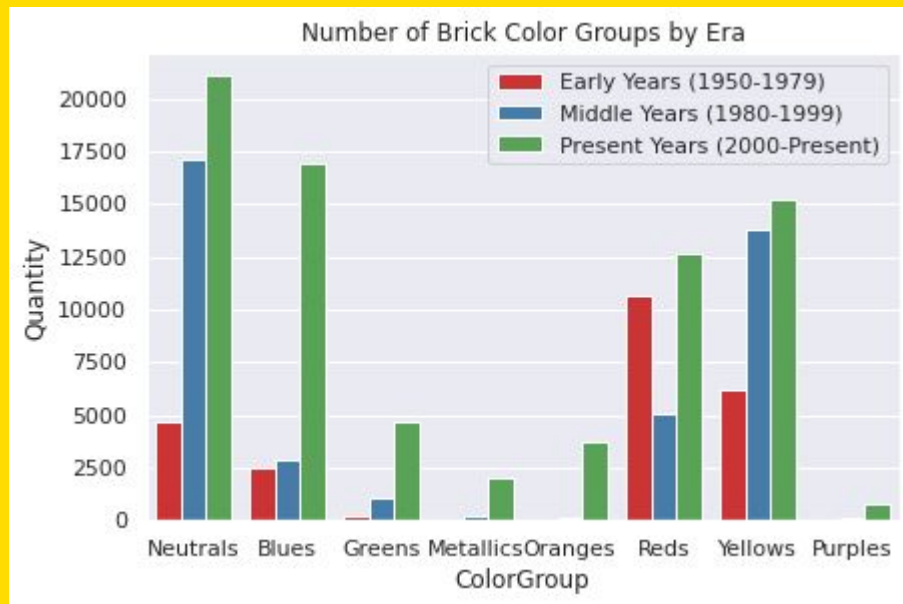


Observation

Distribution of Brick Colors Over Time (Colors Mapped to Color Groups)

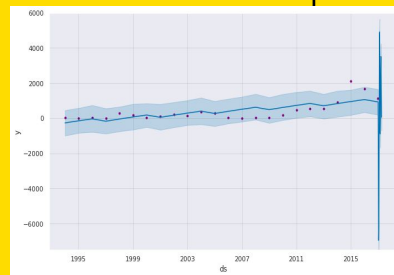
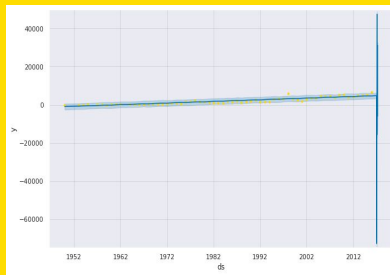
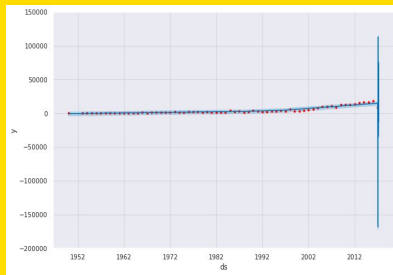
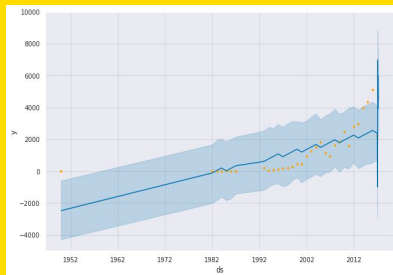
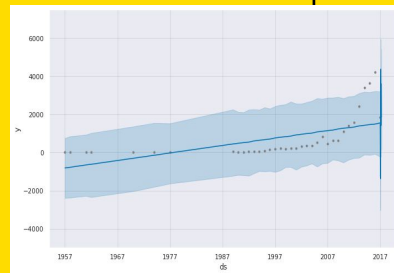
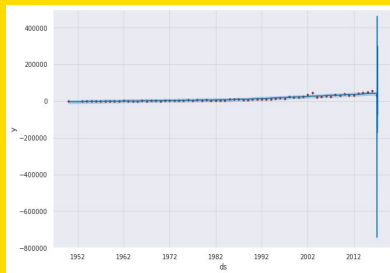
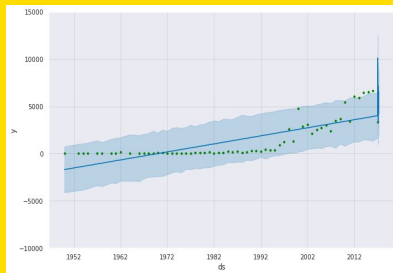
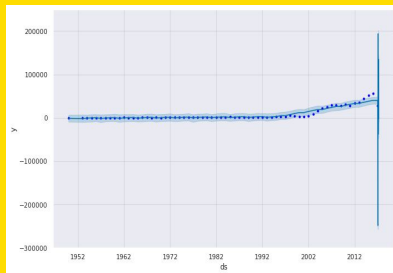


Observation



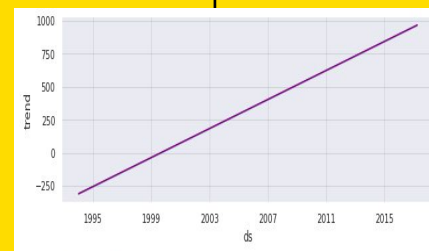
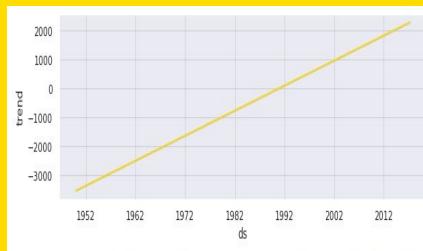
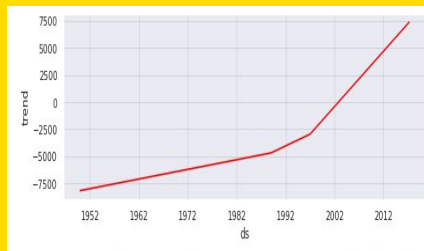
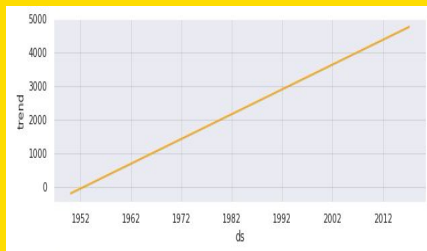
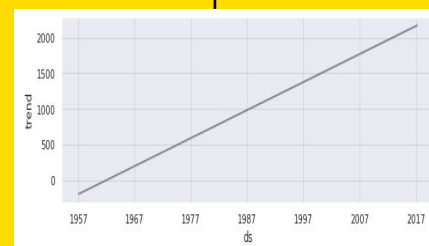
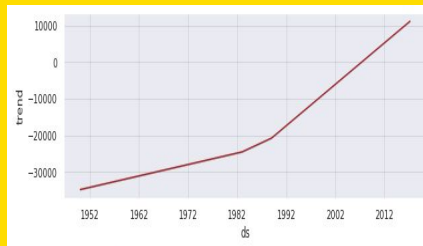
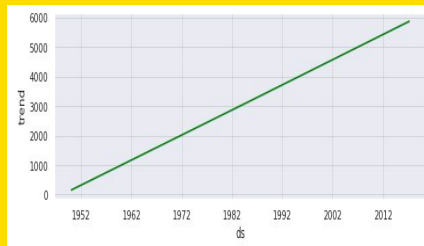
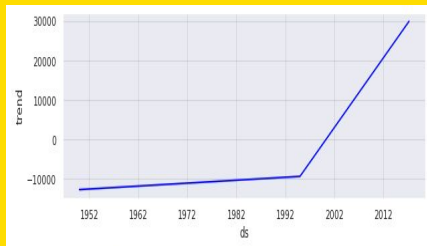
Analysis

Time Series Analysis by Brick Color - Prophet Models



Analysis

Time Series Analysis by Brick Color - Trend Predictions



Analysis

Support Vector Machine - Classification Attempt by Brick Color and Quantity

```
✓ [39] poly_accuracy = accuracy_score(y_test, poly_pred)
0s poly_f1 = f1_score(y_test, poly_pred, average='weighted')
print('Accuracy (Polynomial Kernel): ', "%.2f" % (poly_accuracy*100))
print('F1 (Polynomial Kernel): ', "%.2f" % (poly_f1*100))
```

```
Accuracy (Polynomial Kernel):  6.95
F1 (Polynomial Kernel):  3.43
```

```
✓ ▶ rbf_accuracy = accuracy_score(y_test, rbf_pred)
0s rbf_f1 = f1_score(y_test, rbf_pred, average='weighted')
print('Accuracy (RBF Kernel): ', "%.2f" % (rbf_accuracy*100))
print('F1 (RBF Kernel): ', "%.2f" % (rbf_f1*100))
```

```
Accuracy (RBF Kernel):  2.16
F1 (RBF Kernel):  0.09
```



Recommendation

Trend predictions indicate an increase in all brick colors

Higher increase in quantity predicted for blue, red, and neutral colored bricks

Recommendation, to include all existing color brick groups, with higher quantities of blue, red, and neutral colors.