# Jaguar and Panther Performance Data

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## Introduction

This report provides a descriptive statistical analysis of the recent performance data for both the Jaguar and Panther machines, where the goal is to evaluate and compare their overall performance based on the given key metrics Ada Lovelace, the Operations Manager, tasked us to find their;

- Mean
- Median
- Mode
- Range
- Variance
- Standard Deviation
- Coefficient of Variation

Additionally, visualizations (box plots) are included for clarity, along with the manual calculations of the metrics

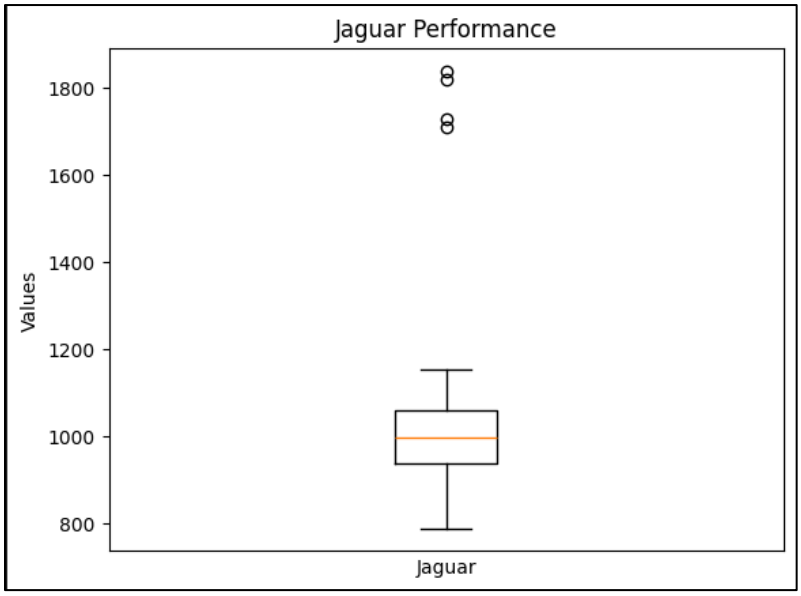
## Data Summary:

### *Panther and Jaguar Performance data:*

| Lot_No | Jaguar | Panther |
|---|---|---|
| **1** | 997 | 1035 |
| **2** | 1153 | 975 |
| **3** | 920 | 982 |
| **4** | 1074 | 1038 |
| **5** | 1013 | 891 |
| **6** | 960 | 907 |
| **7** | 890 | 960 |
| **8** | 910 | 978 |
| **9** | 944 | 1041 |
| **10** | 1065 | 1026 |
| **11** | 1083 | 590 |
| **12** | 1820 | 990 |
| **13** | 859 | 1076 |
| **14** | 1043 | 1092 |
| **15** | 1710 | 1026 |
| **16** | 933 | 935 |
| **17** | 790 | 1710 |
| **18** | 999 | 946 |
| **19** | 1028 | 1073 |
| **20** | 976 | 986 |
| **21** | 1015 | 1078 |
| **22** | 932 | 969 |
| **23** | 957 | 1083 |
| **24** | 936 | 790 |
| **25** | 977 | 1007 |
| **26** | 1037 | 934 |
| **27** | 997 | 999 |
| **28** | 1730 | 1011 |
| **29** | 1046 | 942 |
| **30** | 1840 | 1090 |

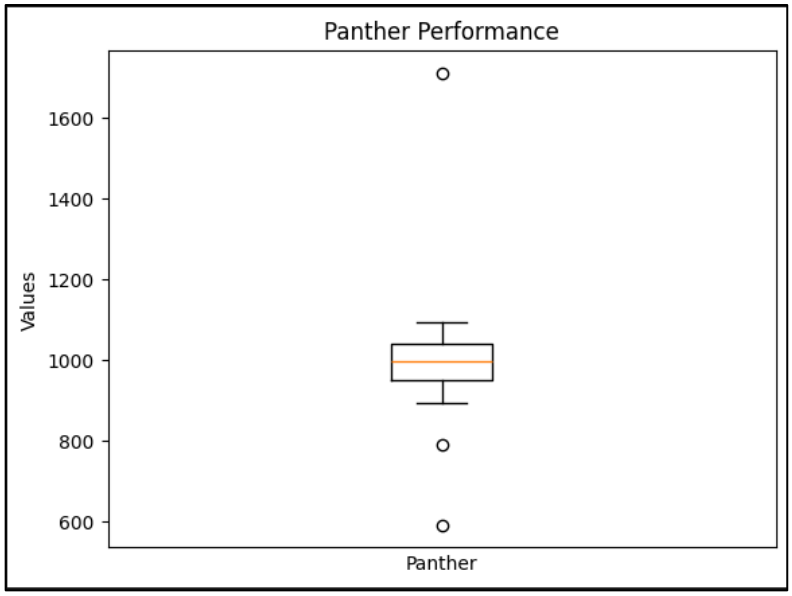
## *Descriptive Statistics // Visualizations*

### Jaguar Machine:

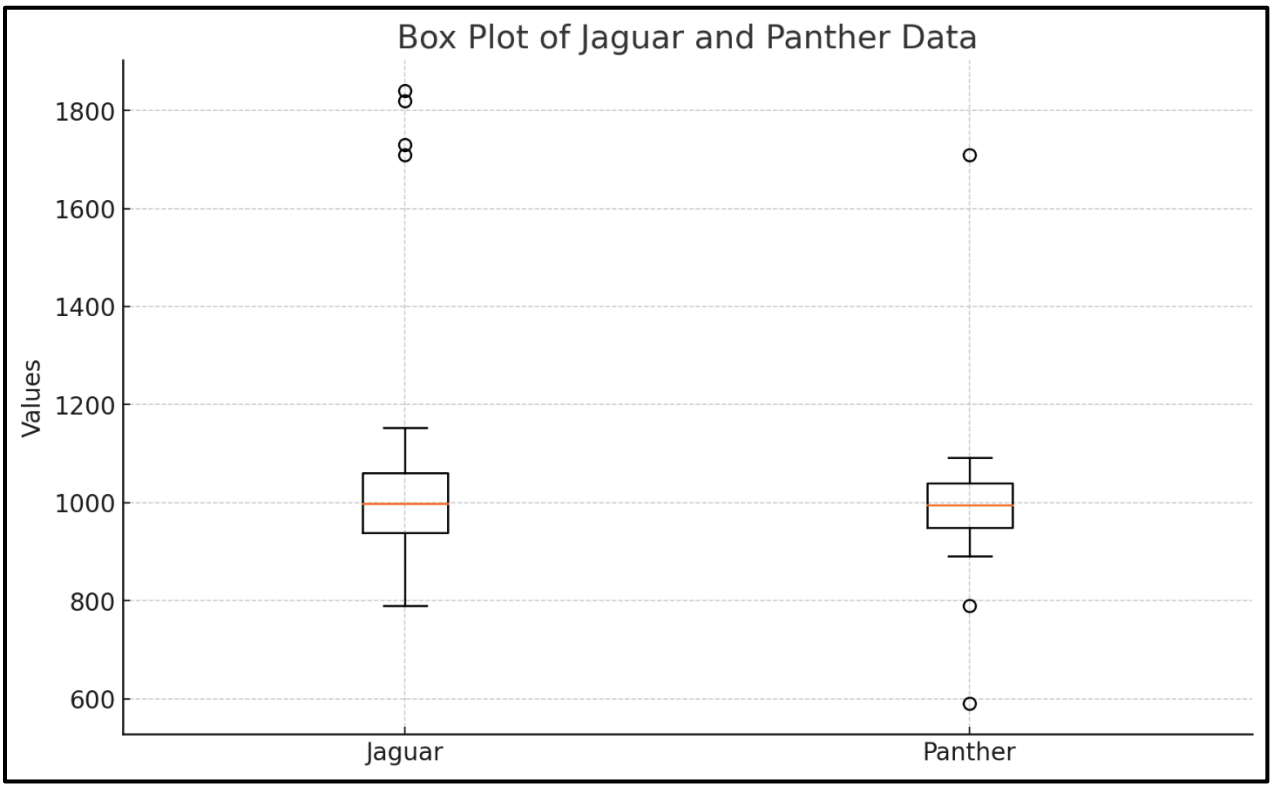



| | |
|---|---|
| Mean | 1087.8 |
| Median | 998 |
| Mode | 997 |
| Range | 1050 |
| Variance | 80749.82 |
| Standard Deviation | 284.17 |
| Coefficient of Variation | 0.26 / 26% |

### Panther Machine:




| | |
|---|---|
| Mean | 1005.33 |
| Median | 994.5 |
| Mode | 1026 |
| Range | 1120 |
| Variance | 27642.85 |
| Standard Deviation | 166.26 |
| Coefficient of Variation | 0.17 / 17% |




**Observations:**

1. Jaguar:
    - Shows a slightly higher mean than Panther.
    - Median and mode suggest values cluster around 988 and 997, respectively.
    - Moderate variability indicated by a CV of 6.39%
2. Panther:
    - Displays more consistent performance, with a CV of 6.55%
    - No clear mode, indicating a wider spread in values.
    - Panther has a larger range (1120 vs Jaguar's 1050), indicating more outliers

**Hypothesis:**

The performance of the Jaguar machine displays greater variation, as evidenced by its higher standard deviation and coefficient of variation. The values of the SD and the CV suggests that the Jaguar machine has a broader range of outcomes, potentially due to thier performance data.

## Calculations

### Mean:

**Jaguar**

$$997 + 1153 + 920 + 1074 + 1013 + 960 + 890 + 910 + 944 + 1065 + 1083 + 182 + 859 + 1043 + 1710 + 933 + 790 + 999 + 1028 + 976 + 1015 + 932 + 957 + 936 + 977 + 1037 + 997 + 1730 + 1046 + 1840 = 32634$$

$$\frac{32634}{30} = \mathbf{1087.80}$$

**Panther**

$$1035 + 975 + 982 + 1038 + 891 + 907\ 960 + 978 + 1041 + 1026 + 590 + 990 + 1076 + 1092 + 1026 + 935 + 1710 + 946 + 1073 + 986 + 1078 + 969 + 1083 + 790 + 1007 + 934 + 999 + 1011 + 942 + 1090 = 30160$$

$$\frac{30160}{30} = \mathbf{1005.33}$$

### Median

**Jaguar:**

790,859,890,910,920,…,1820,1840

Middle values: 997 and 999

$$Median = \frac{997 + 999}{2} = 998$$

**Panther:**

590,891,907,935,942,…,1078,1090

Middle values: 990 and 999.

$$Median = \frac{990 + 999}{2} = 994.5$$

## Mode

Jaguar: 997

Panther: 1026

## Range

$$Range = Maximum - Minimum$$

**Jaguar:**

$$Range = 1840 - 790 = 1050$$

**Panther:**

$$Range = 1710 - 590 = 1120$$

## Variance

$$\delta^2 = \frac{\sum(x_i - \bar{x})^2}{n}$$

**Jaguar =**

$$(997 - 1087.8)\text{^}2, (1153 - 1087.8)\text{^}2, \dots, (1840 - 1087.8)\text{^}2$$

$$\delta^2 = \frac{\sum(x_i - 1087.8)^2}{30} = \mathbf{80749.82}$$

**Panther =**

$$(1035 - 1005.33)^2, (975 - 1005.33) - 2, \dots, (1090 - 1005.33)\text{^}2$$

$$\delta^2 = \frac{\sum(x_i - 1005.33)^2}{30} = \mathbf{27642.85}$$

## Standard Deviation

$$\delta = \sqrt{\delta^2}$$

**Jaguar =**

$$\delta = \sqrt{80749.82} \approx \mathbf{284.17}$$

**Panther =**

$$\delta = \sqrt{27624.85} \approx \mathbf{166.26}$$

## Coefficient of Variation (CV)

$$CV = \frac{\delta}{X\,(mean)}(100)$$

**Jaguar =**

$$CV = \frac{80749.82}{1087.8}(100) \approx 26\%$$

**Panther =**

$$CV = \frac{166.26}{1005.33}(100) \approx 17\%$$