**Punch Frequency Over 150 Seconds**

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| --- | --- | --- |
| No. | Time (in seconds) | Punches thrown |
| 1 | 0-10 | 47 |
| 2 | 10-20 | 49 |
| 3 | 20-30 | 36 |
| 4 | 30-40 | 34 |
| 5 | 40-50 | 31 |
| 6 | 50-60 | 37 |
| 7 | 60-70 | 35 |
| 8 | 70-80 | 33 |
| 9 | 80-90 | 33 |
| 10 | 90-100 | 31 |
| 11 | 100-110 | 30 |
| 12 | 110-120 | 30 |
| 13 | 120-130 | 33 |
| 14 | 130-140 | 28 |
| 15 | 140-150 | 27 |

1. This dataset originates from an experiment I conducted myself at the gym. I measured the number of punches thrown within consecutive 10-second intervals during a workout session, recording this manually over a total duration of 150 seconds.
2. This data represents the number of punches I threw within each 10-second interval. I recorded myself for a total of 150 seconds, giving me 15 entries, and the punches varied from 27 to 49 over the intervals. This indicates the fluctuation in my punches, which gradually came down because of different ways, including fatigue.
3. The domain of this data set spans from 0 to 150 seconds in 10-second intervals. The range varies from 27 to 49 punches per interval.
   1. In terms of a functional relationship:

Domain (Input): Time intervals in seconds, such as [0-10, 10-20, ..., 140-150].

Range (Output): Punches thrown in each time interval, such as [47, 49, ..., 27].

1. Describing both:
   1. Numerical differentiation:

This will give me an idea about the rate of change of punches over time which corresponds to punching speed or punches by second. By differentiating this data, I can analyze how quickly my punch count increased or decreased.

* 1. Numerical Integration:

Numerical integration will be similar to summing up all the punches I threw across all the time intervals to find the total number of punches. This will provide total punches thrown during the entire 150-second interval.

1. From this dataset, I can learn how consistent or inconsistent I am with my punching speed over time. Are there any specific moments where fatigue steps in and my number of punches goes significantly down? Also, I can understand if there was a period where my endurance was high.
2. The code that I used to graph the data:

import matplotlib.pyplot as plt

# Data from the table

time\_intervals = list(range(0, 151, 10)) # Time intervals in seconds

punches\_thrown = [47, 49, 29, 31, 34, 33, 37, 33, 33, 31, 30, 30, 33, 28, 27] # Punches thrown in each interval

# Plotting the data

plt.figure(figsize=(10,6))

plt.plot(time\_intervals[:-1], punches\_thrown, marker='o', linestyle='-', color='b')

# Adding labels and title

plt.title('Punches Thrown Over Time', fontsize=16)

plt.xlabel('Time (seconds)', fontsize=14)

plt.ylabel('Punches Thrown', fontsize=14)

# Showing the grid for better readability

plt.grid(True)

# Display the plot

plt.xticks(time\_intervals[:-1])

plt.show()

A graph with a line going up

Description automatically generated

1. The three different errors that came to mind are:
   1. Human Error: Since I manually counted the punches looking at the video, I may have made an error counting them, especially at higher speeds.
   2. Measurement error: The video recording might not have been recorded properly. i.e. because of frame rates or resolutions.
   3. Physical conditions: Fatigue and inconsistent effort may bring distortions to the experiment. This may have affected the punch count.