Mining for Patterns: An Analysis of NITJ WiFi Speeds

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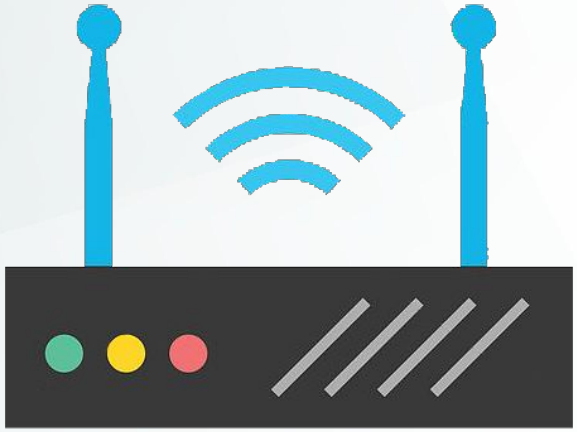


Introduction & Objectives

- What? An analysis of WiFi speed test data collected from various locations on the NITJ campus.
- Why? To understand network performance and find actionable patterns.

- Objectives:
  - Analyze typical download/upload speeds.
  - Identify how performance varies by location.
  - Discover patterns based on time of day.
  - Visualize findings using R.

The Dataset

- Source: NITJ_WiFi_Speed.csv
- Size: ~270 observations

- Key Columns:
  - spot_location (e.g., 'New Library Building')
  - d_speed(mbps)
  - u_speed(mbps)
  - pk_loss(%)
  - date & time

Methodology

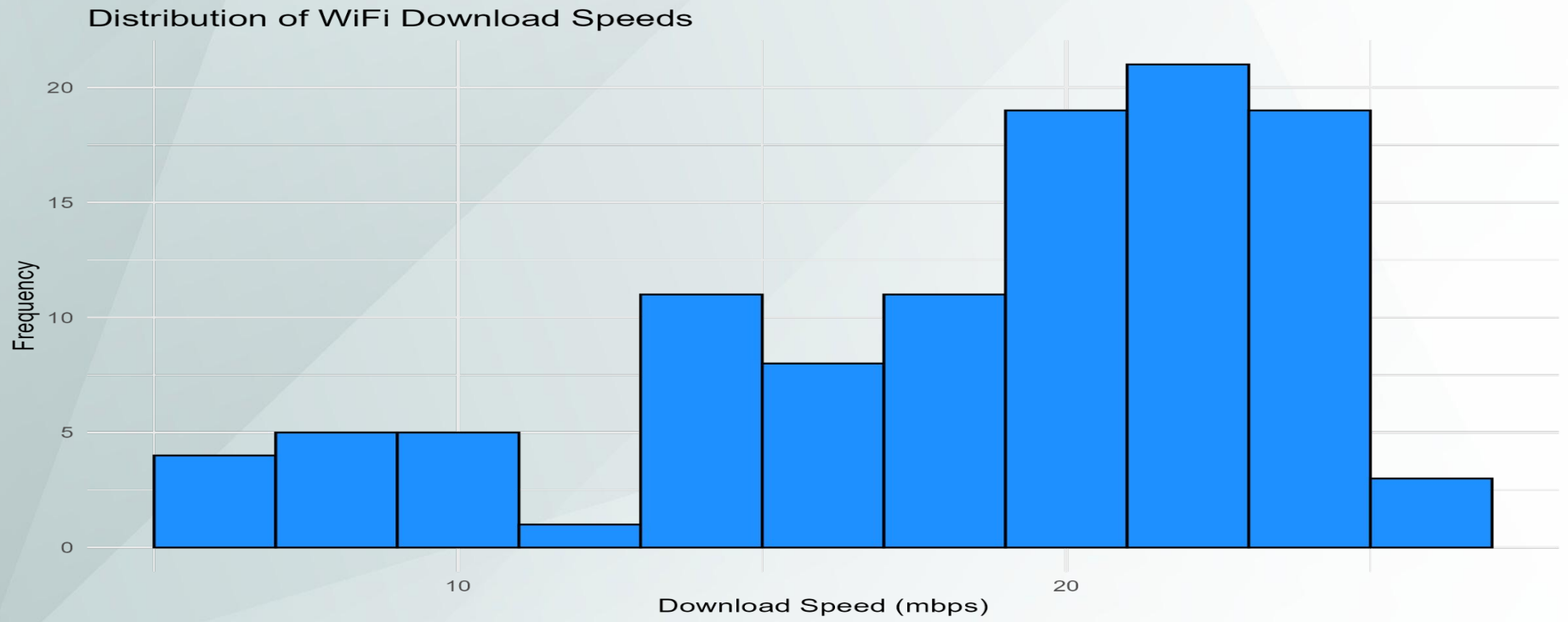
- Tool: R Programming Language & RStudio
- Packages: tidyverse (for data wrangling & plotting), lubridate (for time), janitor (for cleaning)

- Process:

  1. Load: Read the CSV data.
  2. Clean: Standardized column names and location text.
  3. Feature Engineering: Created hour_of_day column.
  4. Analyze & Plot: Aggregated data and generated 6 plots (Histograms, Boxplots, Bar Charts, etc.).

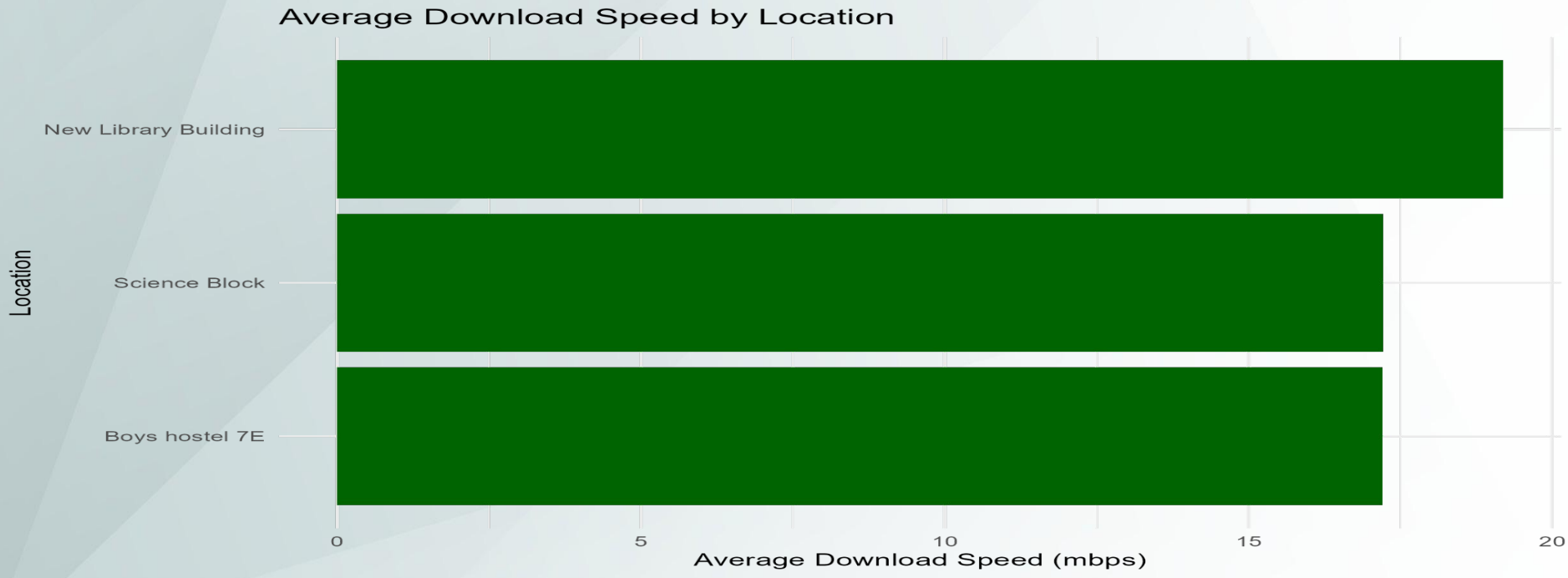
Result 1 - How Fast is the WiFi?

- Finding: The most common download speed is 20-22 mbps.
- Takeaway: The vast majority of tests fall within a solid 15-25 mbps range, indicating generally good performance.



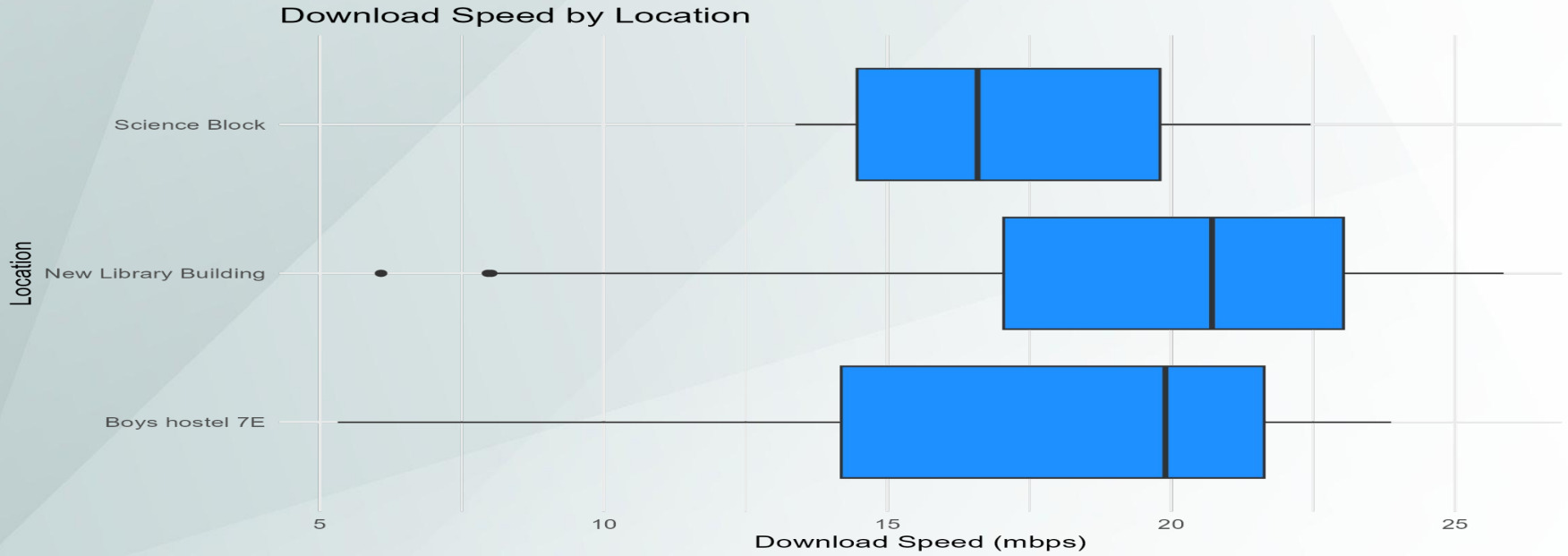
Result 2 - Which Location is Fastest (Average)?

- Finding: Location is a major factor for average speed.
- Takeaway: The 'New Library Building' has the highest average speed, while the 'IT Block' and 'Science Block' are consistently slower.



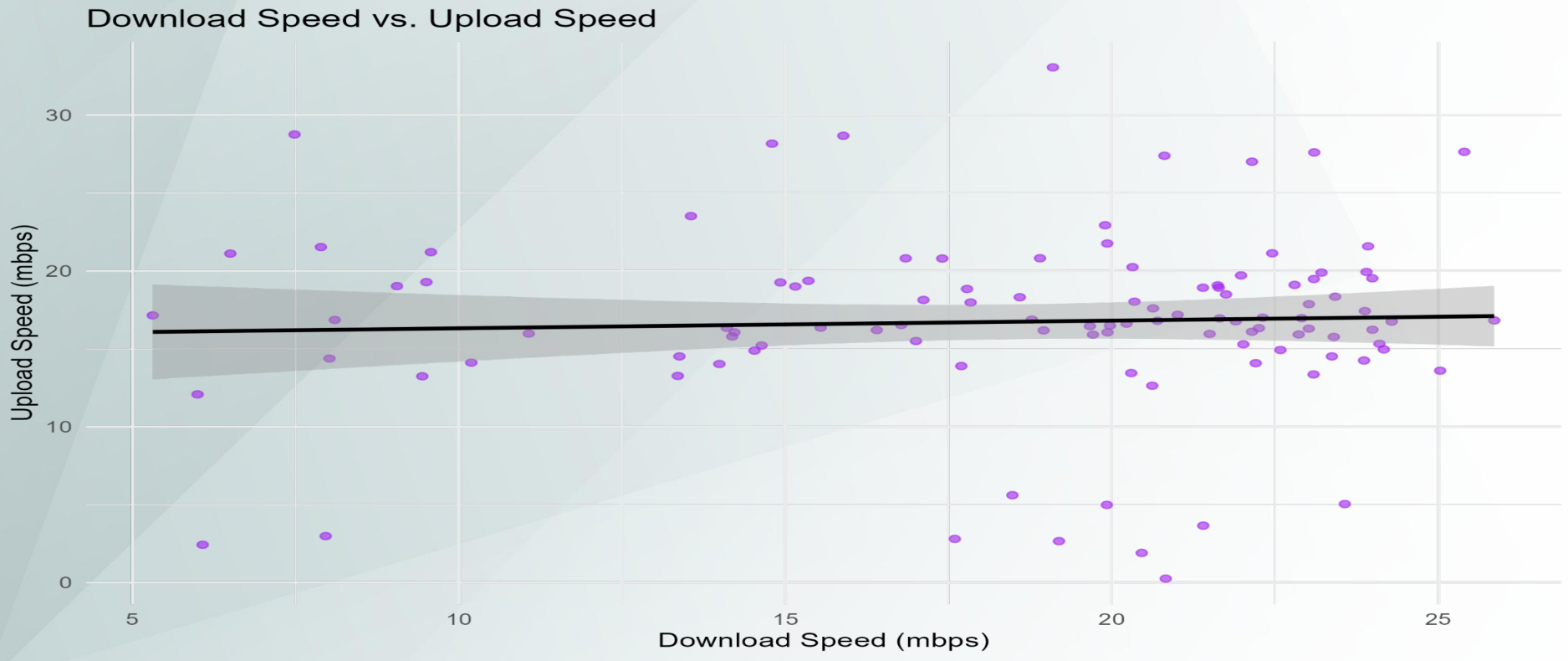
Result 3 - Which Location is Most Reliable?

- Finding: This boxplot shows the full distribution (median, spread, and outliers) for each location.
- Takeaway: It confirms the 'New Library Building' is fastest. It also shows the 'IT Block' is unreliable, with a very wide spread of results and many low-speed outliers.



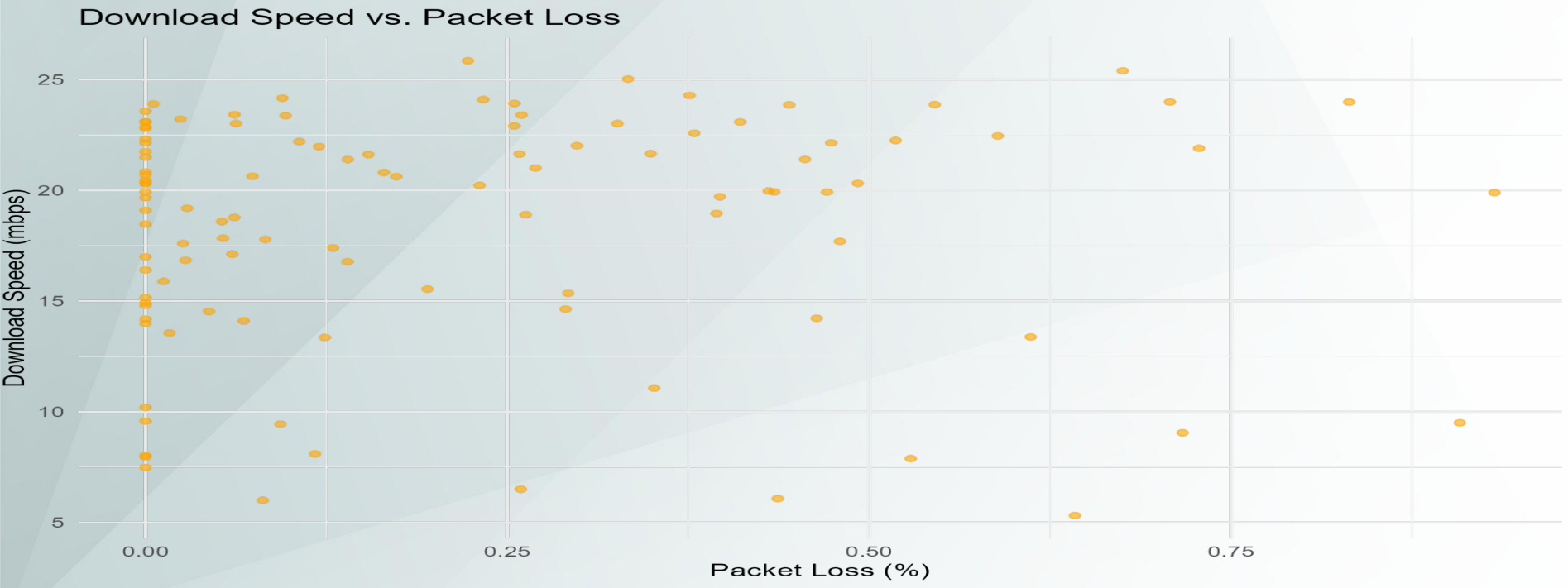
Result 4 - Other Correlations

- Finding 1 (Left): Download and Upload speeds are positively correlated. If one is fast, the other usually is too.



Result 4 - Other Correlations

- Finding 2 (Right): Packet Loss is almost 0% for all tests. This is excellent and means the connection is very stable.



Conclusion & Questions

- Key Findings:
  - Good Speed: Typical speed is 15-25 mbps.
  - Location is Key: The 'New Library' is the fastest and most reliable spot. The 'IT Block' is unreliable.
  - Time Matters: Fastest in the afternoon, slowest at 3 AM.
  - Very Stable: Packet loss is near zero.