

A decorative graphic on the left side of the slide consists of a network of thin, light green lines. These lines are arranged in a way that resembles a circuit board or a stylized tree, with many small circles at the end of the branches, creating a complex, interconnected pattern.

# ULTRAINSIGHT: ANALYZING PACES, AGES, AND TRENDS IN ULTRAMARATHON FINISHERS

BY CLAIRE LUEKING

# QUESTIONS TO ANSWER



- What are the average paces sustained over ultramarathons for finishers?
- What are the average paces of the top 20% of the field in each race distance?
- What year(s) had the most finishers with paces in the top 20% of the field?
- What outliers are there with pace for finishing certain distance ultramarathons?

# DATA PREPARATION

- Dataset from Kaggle: The Biggest Dataset of Ultramarathon Running [1]
- Reduced dataset to past 10 years (2012 – 2022)
- Only used distance length races (not timed ones)
- Converted mile races to kilometers
- Age column created from old age category one





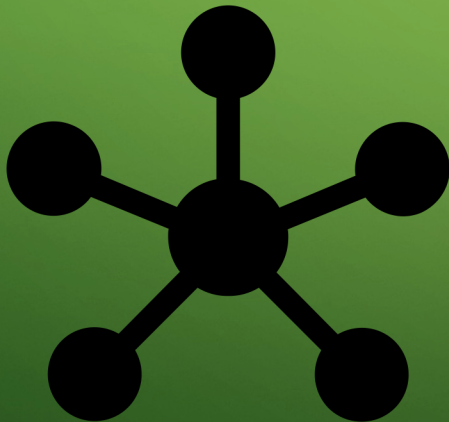
# TOOLS USED

- Visual Studio Code, Python, and Jupyter Notebook
- Packages: numpy, pandas, matplotlib, seaborn, plotly.graph\_objs, plotly.io
- Class textbook for equations [2]



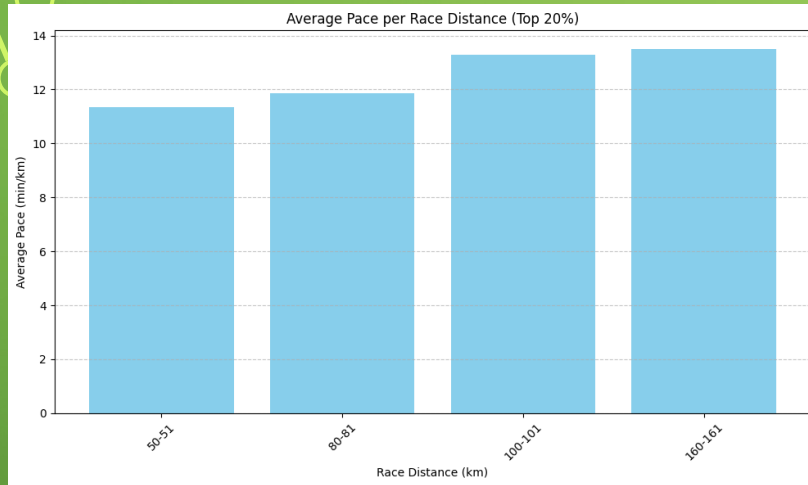
# CLUSTERING

- Unsupervised clustering by hand for 1D dataset for “Event distance”

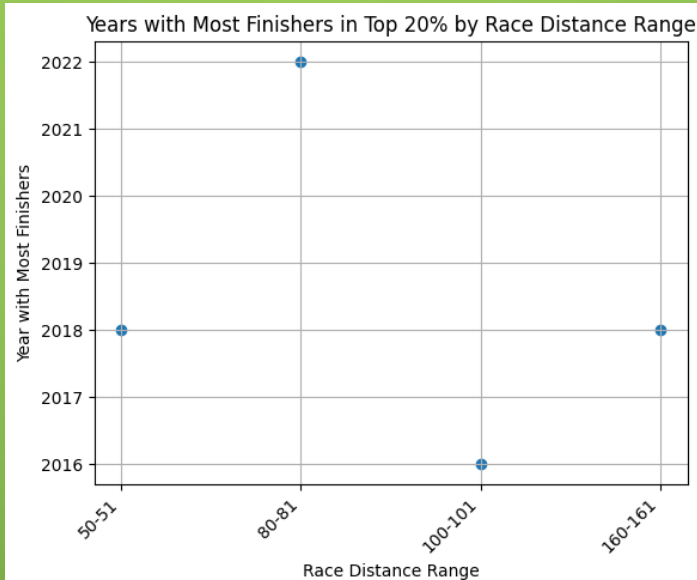


# KNOWLEDGE GAINED

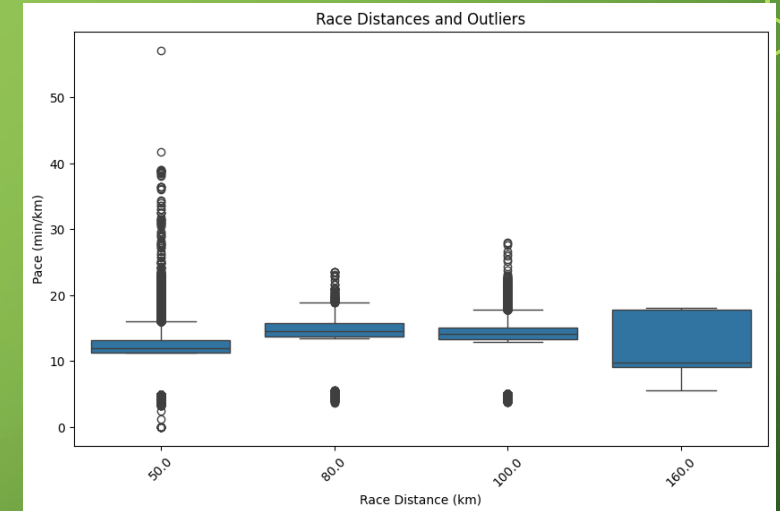
Graphs from Final  
Project Paper [3]



- Pace slows down as race length increases



- Most finishers of 50 and 160 km was 2018, 80 km was 2022, 100 km was 2022



- More outliers with shorter races than longer ones
- Average paces get slower as race length increases

NOTE: The race lengths are binned within 1 km because many ultras are not measured exactly due to the sometime the terrain is rugged.



# APPLICATIONS

- Help plan training and race paces
- Aid broadcasters and coaches in predicting who will win, top ten, etc.
- Outliers help in preparing for worst-case scenarios when racing



# SOURCES

[1] DAVID. 2023. The big dataset of ultra-marathon Running. *Kaggle*.

<https://www.kaggle.com/datasets/aiaiaidavid/the-big-dataset-of-ultra-marathon-running>.

[2] HAN, J., KAMBER, M., AND PEI, J. 2011. *Data Mining: Concepts and techniques 3rd edition*. Elsevier Science, San Diego, CA, USA.

[3] Lueking, E., Claire. 2024. UltraInsight: Analyzing Paces, Ages, and Trends in Ultramarathon Finishers. Boulder, CO, USA.