Sandia National Laboratories FLIGHT PREDICTION

Introduction

Background:

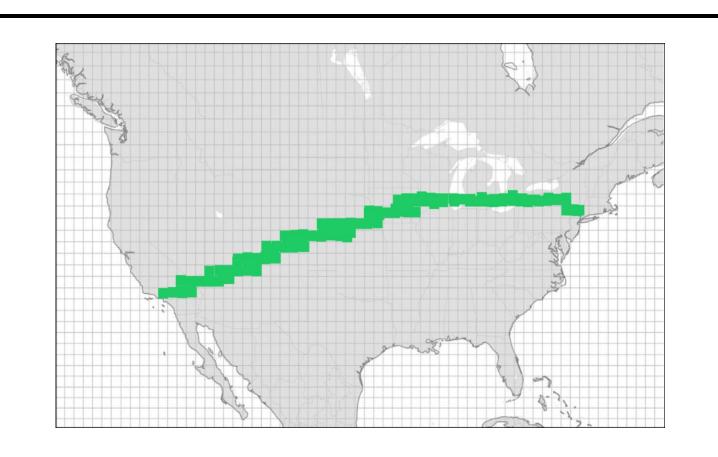
From unreliable sensors to emergencies and bad weather, when ground control loses contact with airplanes, it spells disaster for ground control, airlines, and government agencies.

Motivation:

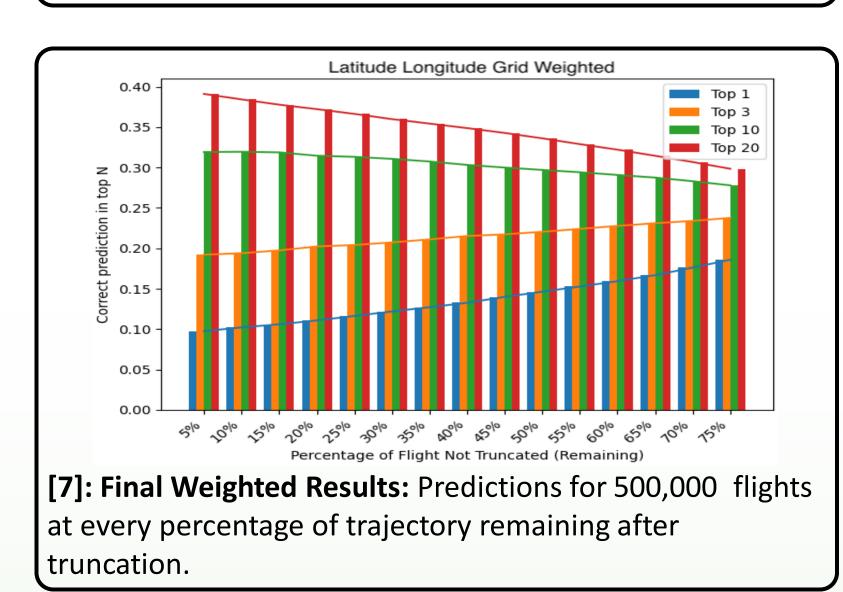
Predicting a flight's destination is an important challenge in motion analysis.

Methodology:

Picture historical flights with paint cans, filling buckets with its destination's color along its course. By comparing the colors of a flight of interest's buckets, we can predict its destination. (See 3) **Tools and Resources used:** Tracktable (trajectories), Anvil (Large Data Processing), Python

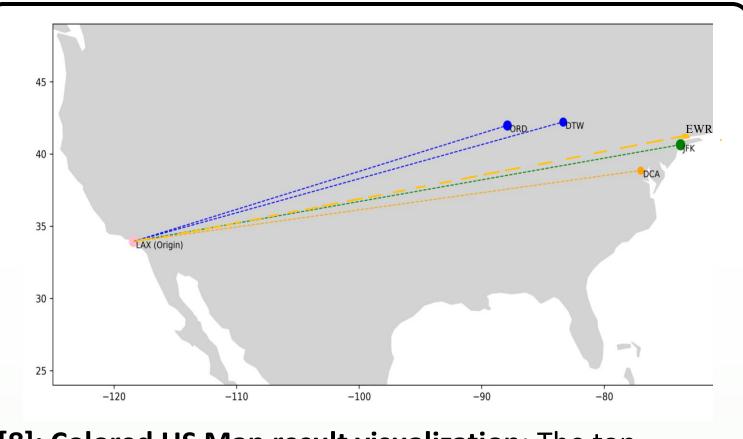


[3]: Overlapping Grid Cells Raster: As a flight (paint cans) travels from LAX-JFK, it will overlap cells (buckets) in the national grid.





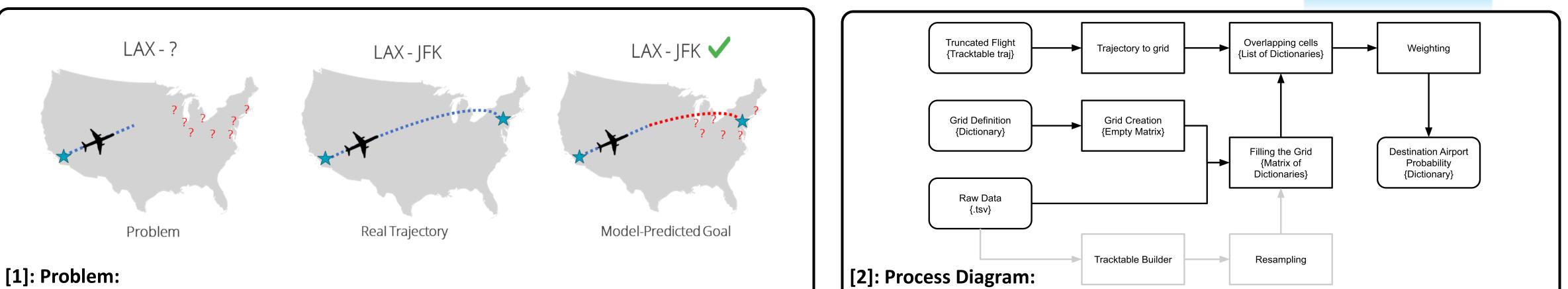
[4]: Content of Cells: Using historical data, flights that pass through a cell have their destinations stored inside the cell; this is accessed and counted when the flight of interest overlaps that same cell.



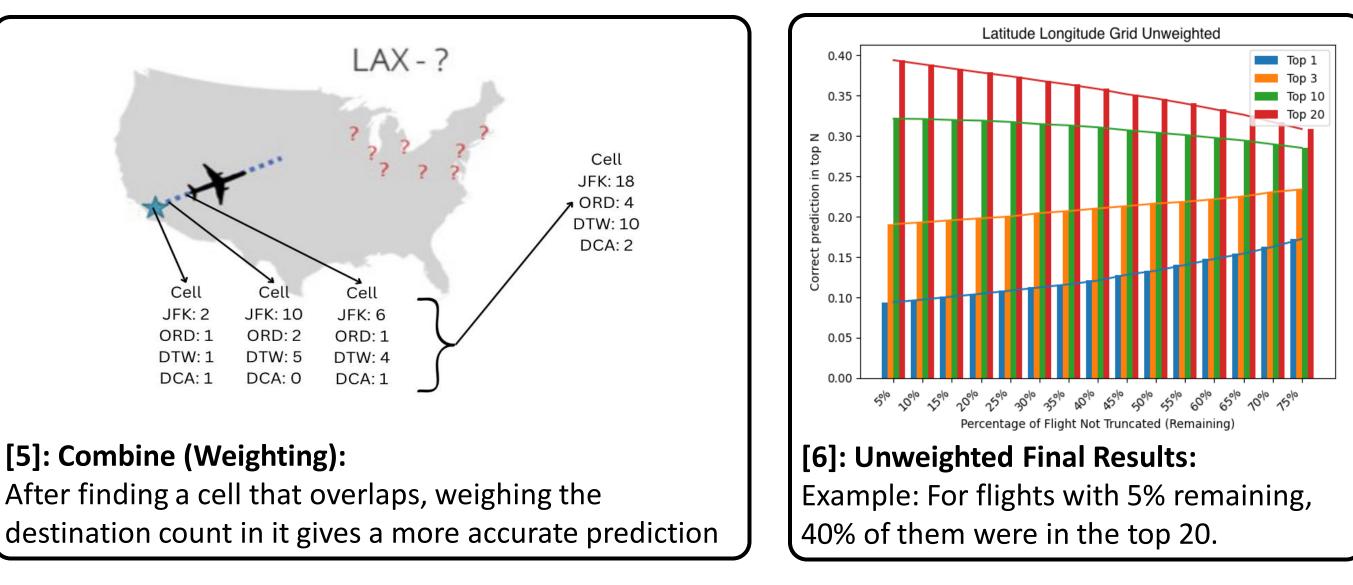


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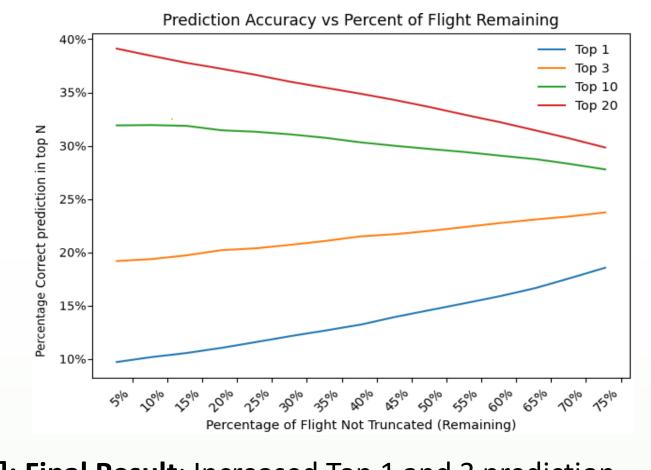
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If a flight disappears, our model should determine its destination from historical data. In the example above, the origin airport is known: LAX. If, halfway through, it loses connection to the ground. Our model should predict its destination, JFK, in a list of Top 20 airports.



[8]: Colored US Map result visualization: The top predicted airport is in green, second and third prediction in yellow, and fourth and fifth prediction in blue.



[9]: Final Result: Increased Top 1 and 3 prediction accuracy while increasing the percent of flight remaining.



Our process involves creating and filling a grid with historical data, determining what cells a flight of interest overlaps with, and adding weighted occurrences of the destination list in each cell to produce a final list of predicted destinations.

Conclusion



Our forecasting accuracy for identifying the top airport stands at 31% and Top 20 Leading Airports it is 75%. Major US airports are so dominant in air traffic that randomly picking from the top airports often lands you within the Top 20 predictions.

Future Work:

What makes flights to smaller airports different from those to larger ones? How can we predict their destinations? Acknowledgements:

Dr. Andy Wilson, Dr. Kat Ward, and The Data Mine staff! **References:** Tracktable and Python Documentation

