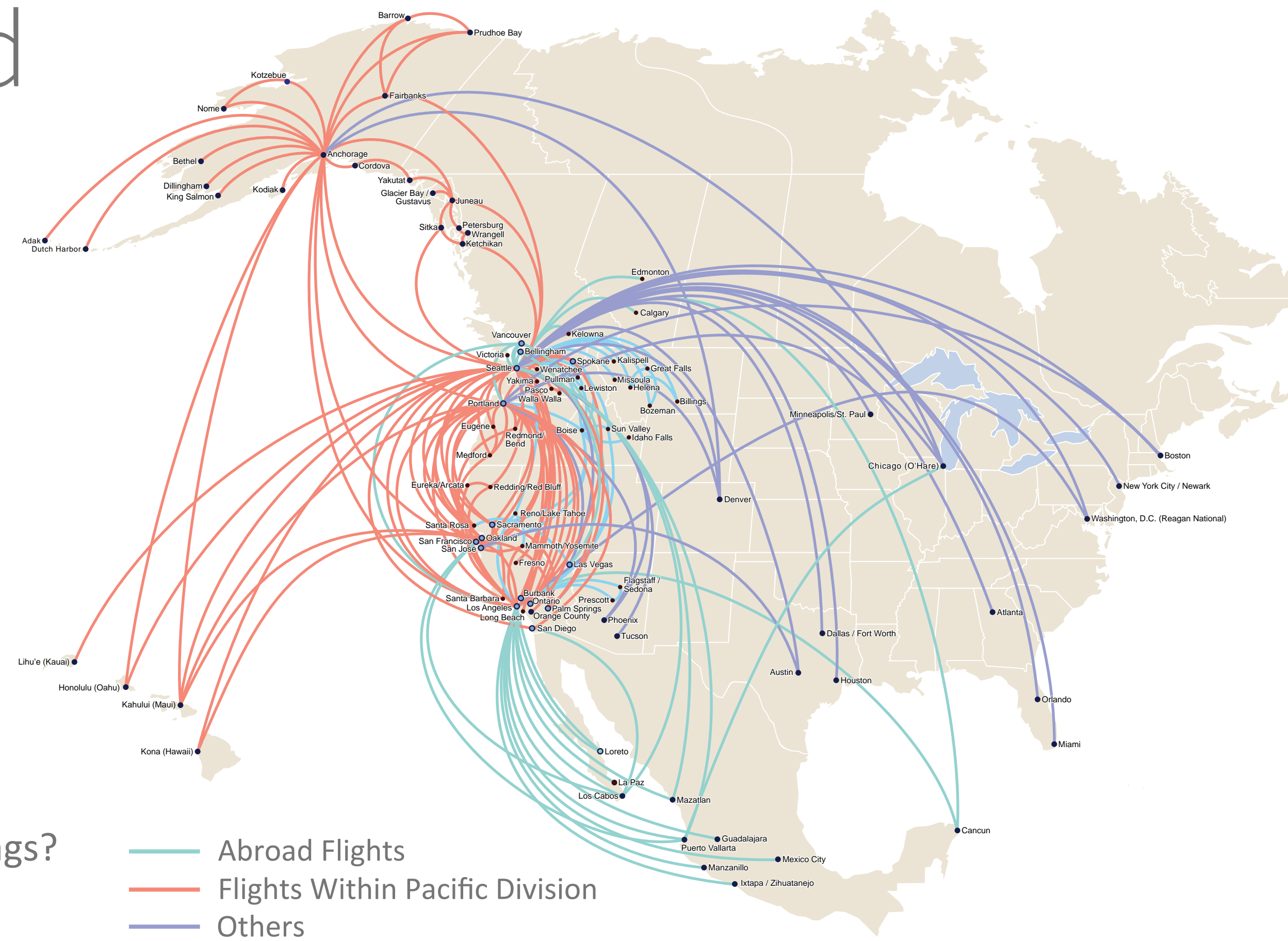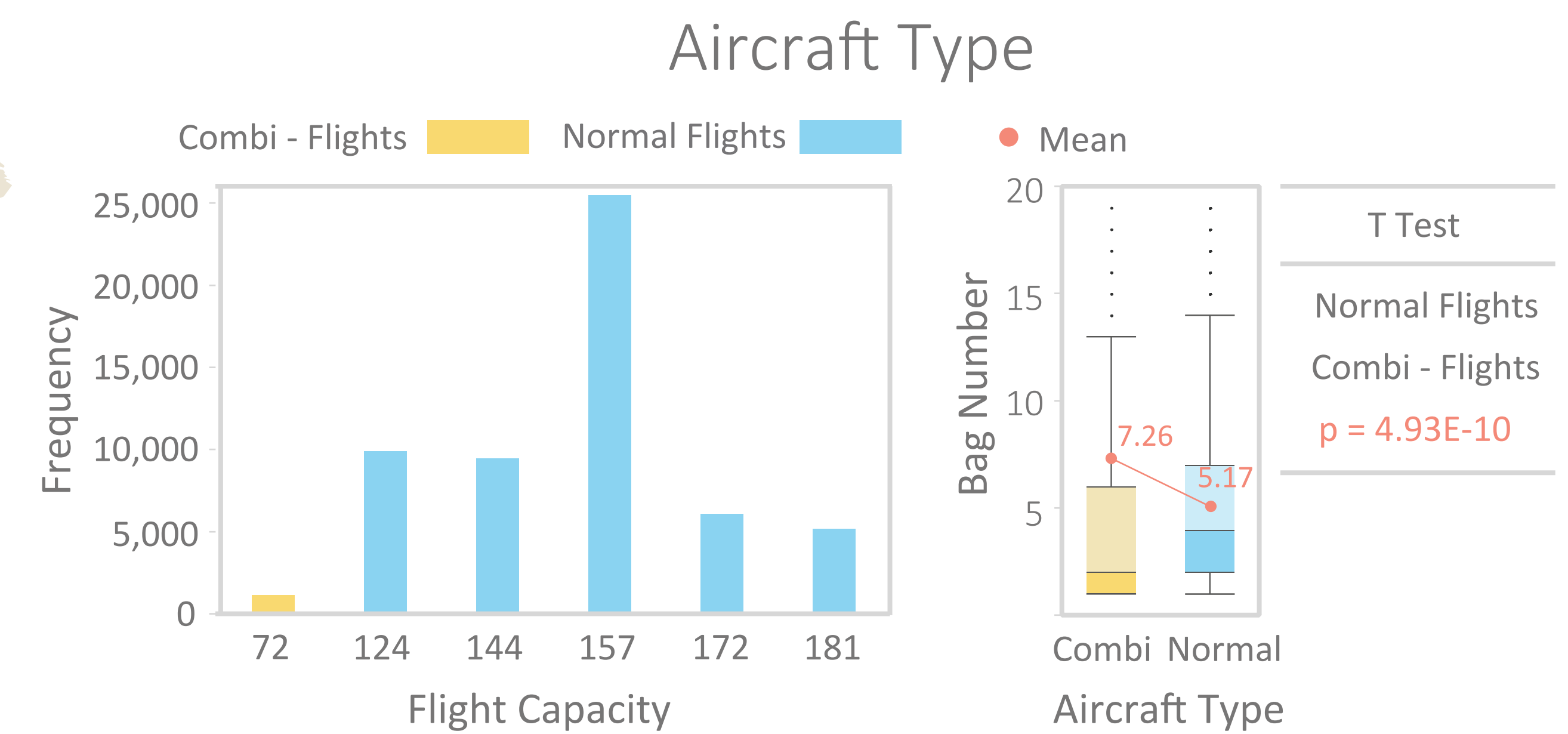# Alaska Airlines Carry-on Baggage Predictive Analytics

Project Background

After Oct. 30th, 2013, Alaska Airlines began to charge passengers $25 each for the first and second checked bags, so a lot more passengers started to carry their bags on the flight. Since then passengers constantly experienced flight delay due to the fact that too many carry-on bags cannot be stowed in the limited overhead bins. If the approximate number of "problematic" carry-on bags of each flight can be known in advance, Alaska Airlines can prepare much earlier to avoid flight delay.
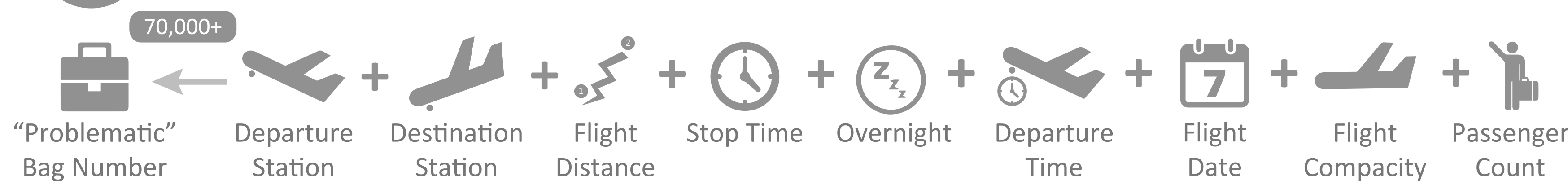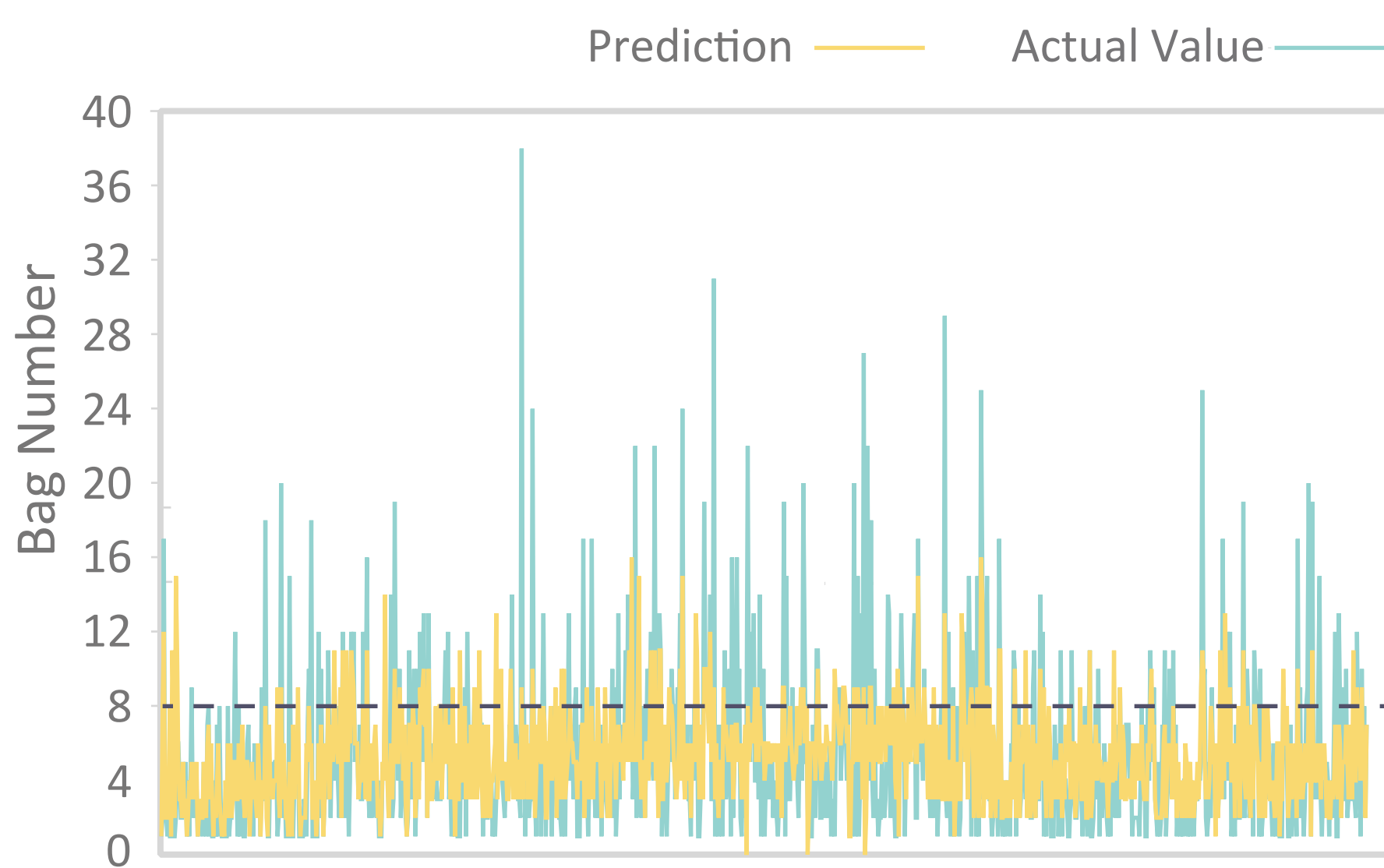
Key Problem

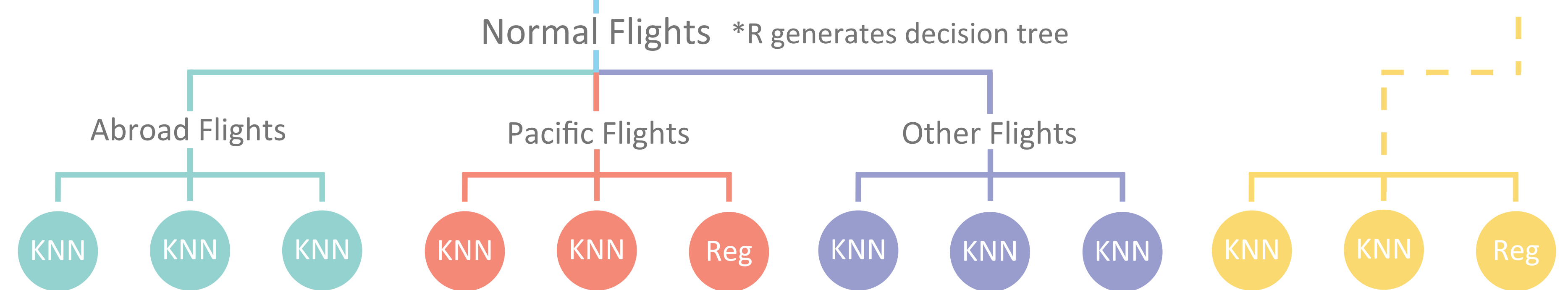Which flights tend to have more "problematic" carry-on bags?

Data Preparation

70,000+

"Problematic" Bag Number ← Departure Station + Destination Station + Flight Distance + Stop Time + Overnight + Departure Time + Flight Date + Flight Compacity + Passenger Count
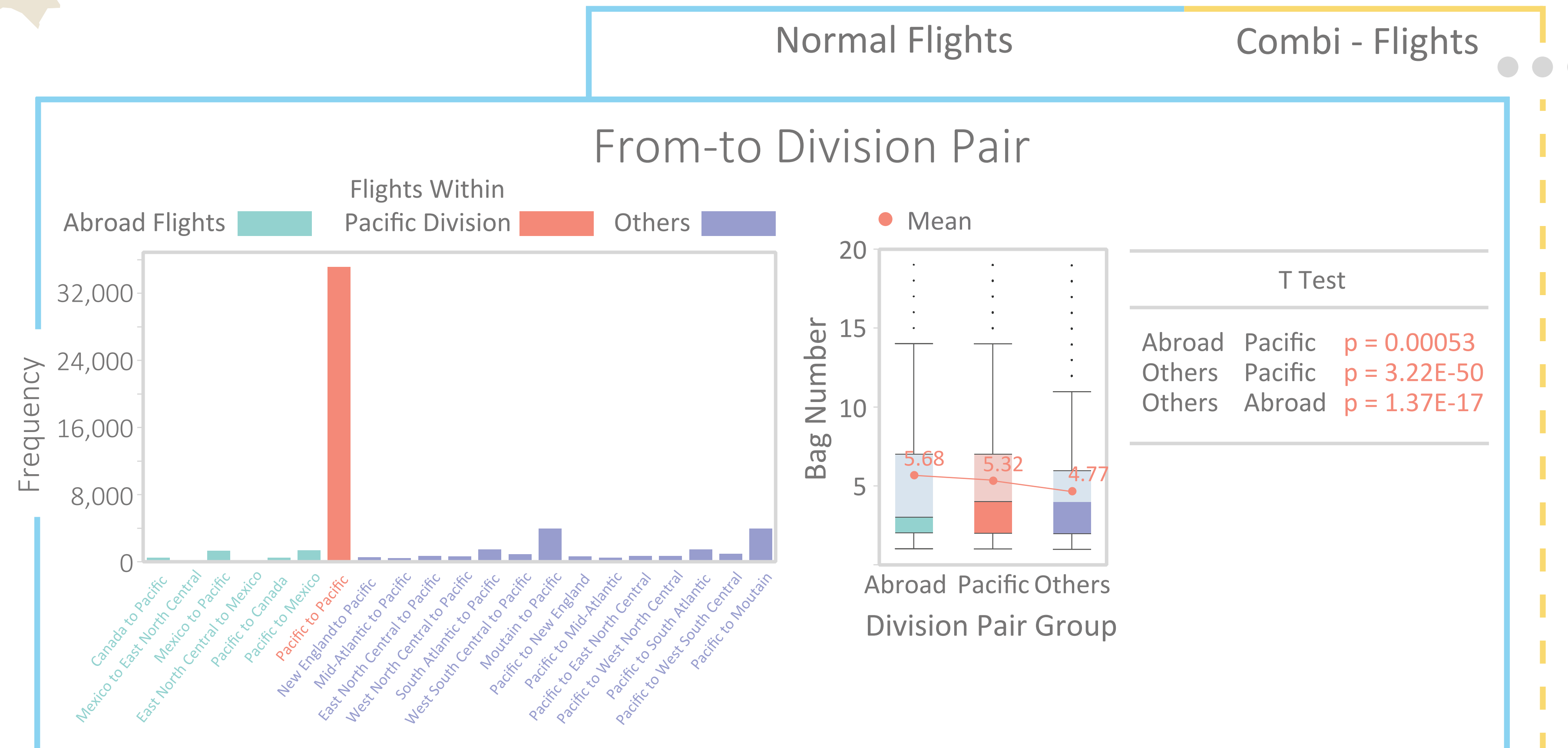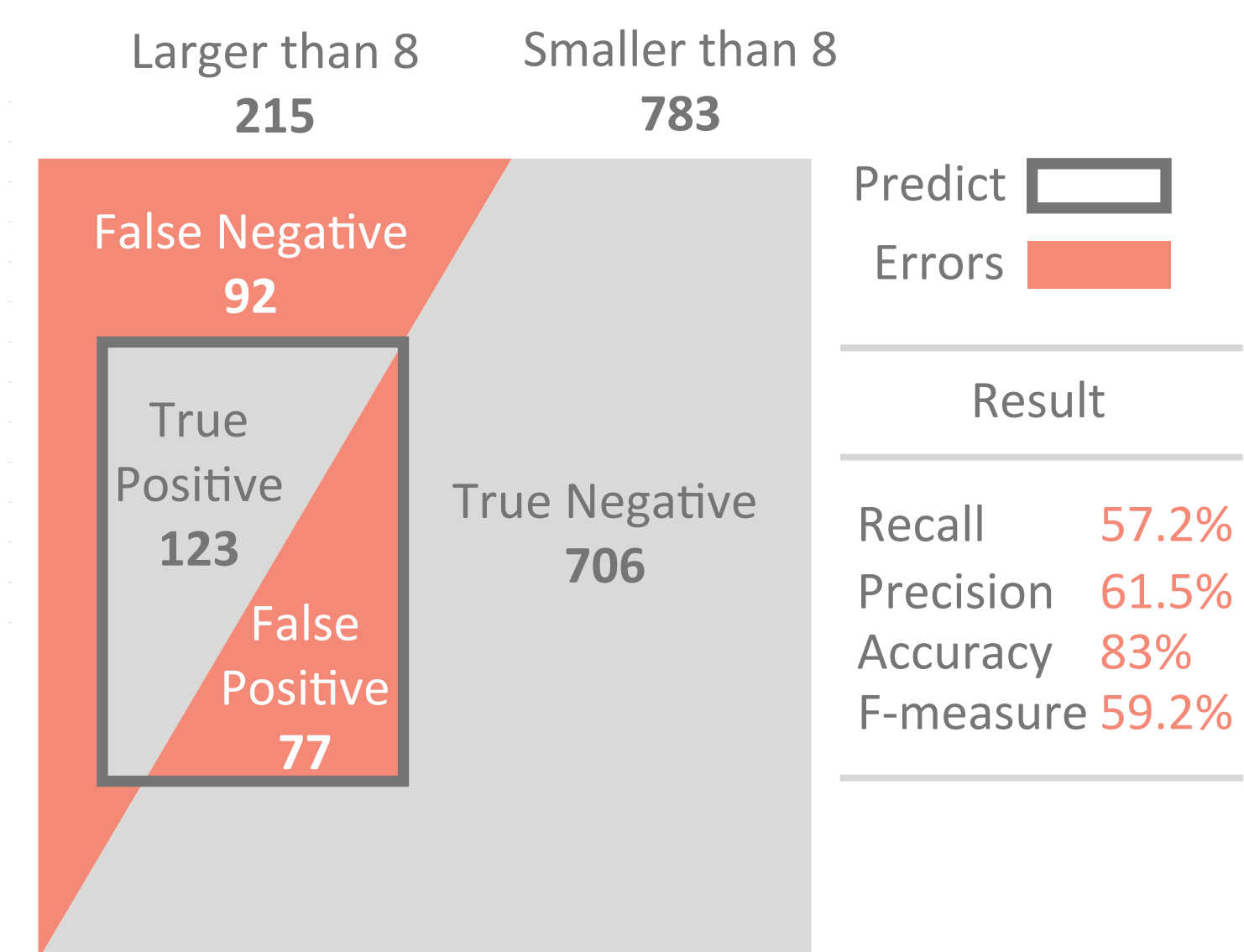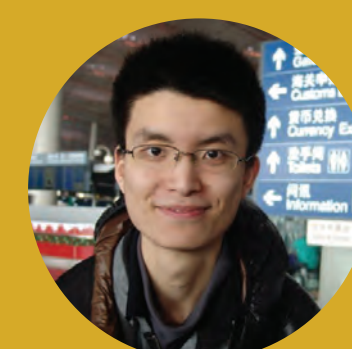
Results

Bag Prediction VS Actual Value

Prediction — Actual Value

Precision and Recall (Threshold at Eight)

Larger than 8 **215**   Smaller than 8 **783**

Predict
Errors

False Negative 92	
True Positive 123	True Negative 706
False Positive 77	

Result

Recall	57.2%
Precision	61.5%
Accuracy	83%
F-measure	59.2%

Map

Abroad Flights
Flights Within Pacific Division
Others

Predictive Analysis

Aircraft Type

Combi - Flights   Normal Flights   ● Mean

Frequency vs Flight Capacity (72, 124, 144, 157, 172, 181)

Bag Number vs Aircraft Type (Combi, Normal)
7.26   5.17

T Test
Normal Flights
Combi - Flights
p = 4.93E-10

Flight and Bag Data

Normal Flights   Combi - Flights

From-to Division Pair

Abroad Flights   Flights Within Pacific Division   Others

Frequency vs Division Pair:
Canada to Pacific, Mexico to East North Central, Mexico to Pacific, East North Central to Mexico, Pacific to Canada, Pacific to Mexico, Pacific to Pacific, New England to Pacific, Mid-Atlantic to Pacific, East North Central to Pacific, West North Central to Pacific, South Atlantic to Pacific, West South Central to Pacific, Mountain to Pacific, Pacific to New England, Pacific to Mid Atlantic, Pacific to East North Central, West South Central, Pacific to South Atlantic, Pacific to West South Central, Pacific to Mountain

Bag Number vs Division Pair Group (Abroad, Pacific, Others)
5.68   5.32   4.77

T Test

Abroad	Pacific	p = 0.00053
Others	Pacific	p = 3.22E-50
Others	Abroad	p = 1.37E-17

Normal Flights   *R generates decision tree

Abroad Flights: KNN, KNN, KNN
Pacific Flights: KNN, KNN, Reg
Other Flights: KNN, KNN, KNN

KNN, KNN, Reg

Meet Our Awesome Team

Information School
UNIVERSITY of WASHINGTON
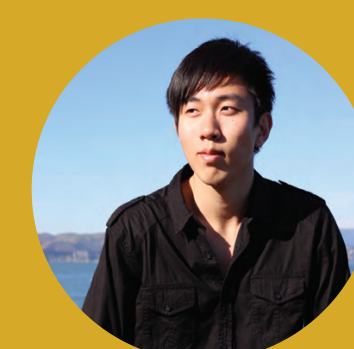
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