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**

- "Problematic" Bag Number
- Departure Station
- Destination Station
- Flight Distance
- Stop Time
- Overnight
- Departure Time
- Flight Date
- Flight Capacity
- Passenger Count

**Results**

**Bag Prediction VS Actual Value**

<table>
<thead>
<tr>
<th>Bag Prediction</th>
<th>Actual Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction</td>
<td>Actual Value</td>
</tr>
</tbody>
</table>

**Precision and Recall (Threshold at Eight)**

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>False Negative</td>
<td>92</td>
</tr>
<tr>
<td>True Positive</td>
<td>123</td>
</tr>
<tr>
<td>False Positive</td>
<td>77</td>
</tr>
</tbody>
</table>

**From-to Division Pair**

- Abroad Flights
- Flights Within Pacific Division
- Others

**Aircraft Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combi - Flights</td>
<td>20</td>
</tr>
<tr>
<td>Normal Flights</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
</tr>
</tbody>
</table>

**Predictive Analysis**

**Flight and Bag Data**

- Normal Flights
- Combi - Flights

**T Test**

- Normal Flights vs Abroad Flights: p = 0.00053
- Normal Flights vs Pacific Flights: p = 3.22E-50
- Normal Flights vs Others: p = 3.7E-17

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