

Flight Spill Detection

submitted by Air Canada

Context

The basic principle of revenue management is to try, as much as possible, to sell the right seat to the right passenger at the right price and the right time. The goal is to maximize the revenue of each seat sold. Since it is impossible to know with certainty each passenger's willingness to pay a particular price, airlines put a lot of effort into developing complex demand forecasting models. These forecasts are used to assign a value to each seat via a network optimization. This control value (for each seat) ultimately determines the price of each seat offered by the company.

Problem

One of the key performance indicators used in the airline industry is the measure of spill. A flight is in a "spill situation" if all its seats have been sold before departure. Such a situation raises concerns because close-in demand is generally of high value and seats must be saved for customers willing to buy seats a short time before departure. In some cases, all the seats on a flight have been sold several days or even several weeks before departure: this entails (potentially) a lot of unrealized revenue. A spill situation for a given flight is often mainly due to an inaccurate forecast of the demand for that flight.

Desired solution

Knowing beforehand how likely a flight is to be in a spill situation is a step in the right direction (if one wishes to increase revenue). An estimate of this likelihood would help our analyst take necessary actions, calibrate demand, adjust prices, etc.

We are looking for the probability, anywhere on the booking curve, that a flight will eventually be in a spill situation. Ideally it would be desirable to know how many days before departure the spill situation will occur. Here is an example.

On the 31st of January, for a departure on the 14th of March, flight 123 between cities AAA and CCC has a X% chance of being in a spill situation Y days before departure.

Data

Data will be provided by the revenue management department and include the following:

- Flight inventory controls and historical performance;
- Historical availability, demand forecast, and fare forecast.