

Case for 02585 – Forecasting for Airports

Description:

Airports are often described as small cities with thousands of employees and millions of passengers going through. There is a great potential in optimizing airport operation to work as efficiently as possible and deliver a better passenger experience.

A foundation for optimizing airports are high accuracy passenger forecasts. Passenger forecasts are used by many employees across an airport, and trusted by multiple operational departments, for example for planning and determining number of staff required for the security checkpoint, check-in area, retail area, and border control.

At Copenhagen Optimization we have developed a forecasting solution for airports called Better Forecast. Better Forecast has been developed using best practices within agile development, working closely with several airports to ensure that the forecasting algorithm generates accurate forecasts.

However, we do see a potential to improve the forecast methodology by introducing machine learning and would like to explore this potential.

The goal is to forecast the expected number of passengers per flight as a share of seats. The number of passengers on a flight is not publicly available. The data handed out is, therefore, for a fictitious airport with approximated tendencies for real-life airports.

The input contains the following variables:

- **ScheduleTime:** Date and time of departure for the flight
- **Airline:** Abbreviation code for airline
- **FlightNumber:** ID number of the flight
- **Destination:** Abbreviation code for destination airport
- **AircraftType:** Abbreviation code for aircraft type
- **FlightType:** J (Scheduled flight), C (charter flight)
- **Sector:** Country code for destination
- **Seat Capacity:** Number of seats on the flights

and the output is the following variable:

- **LoadFactor:** Share of seats occupied by passengers on the flight

The realized data is from 2021-01-01 to 2022-02-28 (the data for February is sent out at the beginning of March). The period that the forecast should be generated for is 2022-03-01 to 2022-03-31 (this data is also sent out at the beginning of March).

You have the freedom to choose any method to analyze the data and produce a passenger forecast per flight.

The output should be a file “output.txt” containing the future schedule for March and with a column added with the forecasted load factor (ratio of number of passengers per flight to seat capacity). In addition to this, a small report (maximum 5 pages) with a description of the pre-processing, modelling, and model assessment should be handed in.



The forecast accuracy is calculated based on the relative difference between the forecasted number of passengers and the actual number of passengers per flight, we will call this the deviation per flight:

Deviation per flight = (Actual passengers – Forecasted passengers) / Actual passengers per flight
and the accuracy per flight is calculated as 100% minus the absolute value of the daily deviation:

Accuracy per flight = 100% - | Deviation per flight |

Given the output generated, we will calculate the total accuracy as the mean of the accuracies per flight, and there will be a price for the forecast with the overall highest accuracy.

Furthermore, you should state your expected total accuracy, and there is another price for the team that gets closest to their estimated total accuracy.

About Copenhagen Optimization:

Copenhagen Optimization is a combined consultancy and software company specialized in analyzing and planning the airport operation on a strategic, tactical, and operational level. Copenhagen Optimization is working with airports all over the world, including Singapore Changi, London Heathrow, Copenhagen, JFK in New York, and many more – with a rapidly expanding client base.

We are a young company established in 2014 and based in Copenhagen. Soon after forming Copenhagen Optimization, we started our journey towards creating the best airport planning solution in the world - Better Airport®. Better Airport® is built for the airport operation with a clear focus on being able to accurately cover the airport operation of any airport in the world.

We currently have 21 full-time employees and are a growing company. We have a consultancy team and development team as well as a sales and marketing team. Our consultancy team consists primarily of engineers with expertise in data analysis and operational research. The team works actively with all users of Better Airport® and consultancy tasks for more than 40 airports worldwide. The skillset of the team is continuously improved through internal knowledge sharing as well as research activities into, for instance, machine learning. Our development team has broad experience and many of our developers have an educational background within mathematics and data science.

