

Applied Machine Learning.

Case: Turbulence Level in Airport Operations by FORCE Technology

Purpose: Predict aircraft turbulence level based on airports wind data

Description: Turbulence levels are important for comfort and safety during aircraft arrival and departure at airports. Some airports are located in landscapes where certain wind patterns cause turbulence. It is important to be able to predict the turbulence levels to be able to warn the aircraft about the turbulence levels. Aircraft turbulence is quantified/ categorized by the amount of vertical acceleration.

In this case the airport has two wind sensors (anemometers) continuously recording wind direction and wind speed at each end of the landing strip/runway. The task is to create an algorithm for predicting the turbulence level experienced by the aircraft during landing and take off within a height of 1500 foot range above the runway based on the readings from the anemometers.

Data:

Anemometer data are available in CSV formatted text files covering 24 hours per day. In total 521 files. Each file contains data for both anemometers logged at 5s intervals. Times are in UTC.

Flight recorder data are available as time series for 3140 arrivals and 3039 departures. Each timeseries is available in a single file containing position, horizontal and vertical speed, accelerations etc. File formats vary slightly with 2-4 different variations depending on the specific aircraft. Experienced turbulence level should be derived and characterized from the time series. The file names identify landing (ARR) or take-off (DEP) and heading defines runway (04 or 22). Times in UTC.

About:

FORCE Technology is a major government-approved Research and Technology Organisation (GTS institute). Our role is to bring new technology into play for the benefit of society by bridging the gap between academia and industry and offer facilities and know how in a large number of fields.

As an example, we conduct investigations of wind and turbulence conditions for the airport construction projects in Greenland.