

## Esenboğa Passenger Capacity Forecast Project

### Business understanding

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Ankara, being capital of Turkey, has a growing number of passengers who prefer airways to travel from one place to the other. Analyzing this fact, M. Sani Şener, CEO of TAV Airports, decided to invest in Esenboğa Airport in Ankara to catch up with the growing demand. Currently, Esenboğa Airport has 20 million passenger capacity, which allows passengers to fly both domestically and internationally. However, Sani Şener wants to know exactly when the passenger count will surpass the airport's overall passenger count, therefore immediately start to plan platform constructions before it is too late. For his purpose, TAV Airport hired our team to forecast when exactly the airport will reach its maximum.

### Data understanding

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Data wrangling was needed in order to work with data that is properly formatted and not so crowded with redundant entries. Therefore, the data provided was prepared accordingly, it is first altered to text format from an Excel file. In addition, the number formats are also changed to work on it easier on Python since the passenger counts are high in number and takes time for Python to analyze. In the end, the data that is worked on has 131 rows and 2 columns, the first column being the date and the second being the passenger count. The subject data starts from January 2008 and continues until October 2018 and involves 10 years of monthly passenger count.

### Coding

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First of all, know-how was discussed within the team and necessary libraries are imported. To forecast the sum of passenger number for the last 12 months, different forecast models are tested and the ones with the least amount of error was placed in the code. Certain attributes are grouped into functions. The variables within the forecast models such as seasonality and window size are tried to be optimized. The code, in general, is worked on to be cleaned from not useful lines, and also it was planned to be appropriate and have needed attributes for use with different data as well.

### Test

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The final output was tested before handing into the leading authority, seeking low errors and overall usability of the data. The error for Moving-Average was **433,175** and the error for Holt-Winters model was **131,620** respectively. Therefore, the chosen model is Holt-Winters method.

### Conclusion

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Using the code, the final conclusion regarding when will Esenboğa Airport in Ankara surpass its maximum capacity has been reached and it is **53 months**, which is 4 years and 7 months later than the last entry. Since the final data is for October 2018, the capacity expansion should be done until **June 2023**.