**Team I1.2 - Predicting On-time Performance in the Airline Industry Using Statistical Modeling**

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**Background Information**

- Occasional flight delays cause disruptions in the worldwide transportation system.
- Airlines suffer penalties and fines which drive up operation costs.
- Passengers plan earlier appointments, increasing travel cost, in order to ensure on-time arrival.
- Accurate on-time performance predictions are crucial for decision making by all stakeholders in commercial aviation.

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**Problem Statement**

The application of existing prediction models has fallen short of expectations in terms of their accuracy.

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**Project Purpose**

This project will attempt to improve the precision of on-time flight performance prediction by applying machine learning and statistical methods to improve existing prediction models. Improved accuracy will enable all stakeholders to make better decisions, plans, and schedules.

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**Objectives**

- Create code that interprets expected variables and their effect on on-time performance
- Implement machine learning to improve existing flight on-time performance models
- Create tabular and graphical output of on-time performance data that is user-friendly

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**Design Approach & Deliverables**

**Software Applications**

An improved on-time performance model will be developed using Python language and machine learning applications in Spyder.

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**Design Model Structure**

The model was constructed in two phases. Phase One is structured to predict whether a flight will be on-time or late. Phase Two will be structured to predict the number of minutes a flight will deviate from its scheduled departure and arrival time based on various input variables.

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**Project Schedule**

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**Literature Review**

- Prediction models have been in existence for quite some time.
- Models have been developed using statistical modelling, such as linear regression.
- Now, machine learning tools are being integrated in prediction models.
- These tools are capable of the most accurate prediction by seeking the correct methodology to use for the data.
- Example using machine learning tools:

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**Evaluation Criteria**

**Phase One:**

- Metric: Binary
- Early by 1 or more mins
- On-Time (delayed by 0-14 mins)
- Delayed 15-29 mins
- Delayed 30 mins or more

**Phase Two:**

- Metric: Scale
- 0-5 mins
- 6-15 mins
- 16-29 mins
- 30-59 mins
- 60 mins or more

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**Model to Predict On-Time Flight Performance**

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**User Interface:**

How To: The user will enter their flight number in the search bar. The app will output the flight’s current status and reasoning.

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**Phase One:**

### Inputs:

- Important Time
- Actual Time

### Outputs:

- Binary Solution: On-Time or Late

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**Phase Two:**

### Inputs:

- Important Time
- Actual Time

### Outputs:

- Improved Graphical Outputs:

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**Google Flights** is one of the few in the market that integrates machine learning tools to predict on-time flight performance. Their model has a prediction accuracy of 89%.