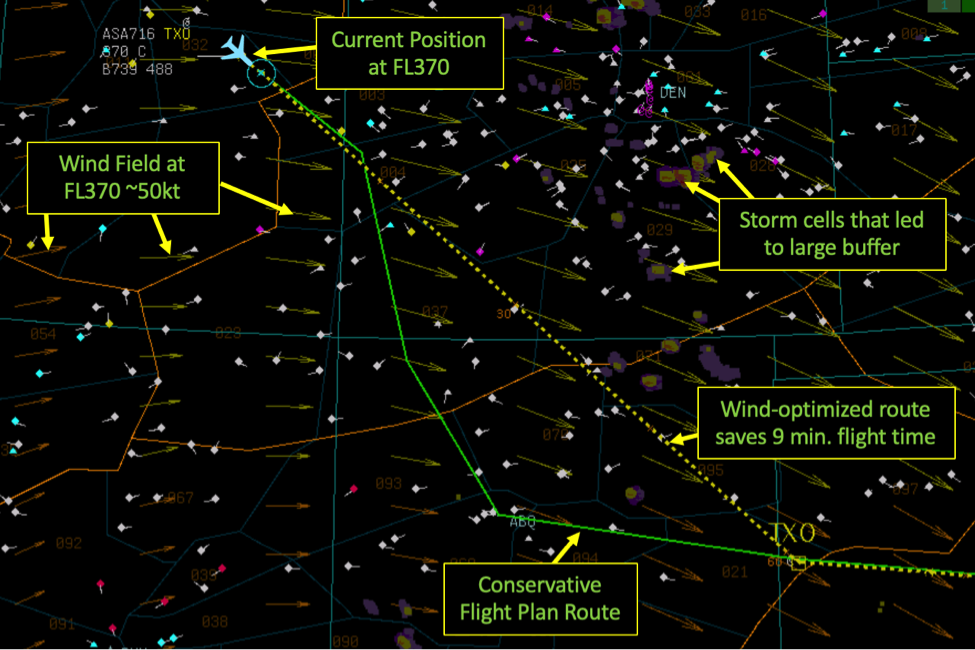
**Aircraft Route Optimization with Genetic Algorithm**

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In the dynamically evolving field of aviation, airlines constantly face the challenge of optimizing flight routes to minimize costs, reduce fuel consumption, and enhance passenger satisfaction. Traditional route planning methods have limitations in adapting to real-time changes in weather conditions, air traffic, and aircraft performance. To address these challenges, the goal of this project is to develop a sophisticated Aircraft Route Optimization system utilizing **Genetic Algorithms (GAs)** to optimize flight routes for a fleet of commercial aircraft.

Airlines operate a vast network of routes connecting numerous airports around the world. These routes must consider multiple variables, including:

**Aircraft Performance:** Different aircraft types have varying ranges, fuel efficiencies, and cruising speeds, which must be taken into account for route planning.

**Weather Conditions**: Weather patterns, such as wind speed and direction, turbulence, and storms, significantly impact flight efficiency and safety. These conditions are subject to change during the flight.

The primary objectives of this project are as follows:

Route Optimization: Develop a GA-based algorithm to optimize flight routes based on aircraft performance and real-time weather data.

Fitness Function: Design a fitness function that considers aircraft performance, weather conditions, and optimization objectives.

Optimization Metrics: Define metrics for optimization, such as minimizing fuel consumption and reducing flight duration.

Simulation: Create a simplified simulation environment to model how the algorithm adapts routes to changing weather conditions.(working)

Visualization: Build a user-friendly interface to display optimized routes and key performance metrics.

At the end of this project, you are expected to **deliver:**

* A comprehensive report detailing the algorithm's design, implementation, and performance evaluation.
* Notebook file i21-XXXX.ipynb of your implementation.
* HTML Files.
* Flask Files.

**References:**

Li Qing, Gao Wei, Lu Yuping and Shen Chunlin, "Aircraft route optimization using genetic algorithms," Second International Conference On Genetic Algorithms In Engineering Systems: Innovations And Applications, Glasgow, UK, 1997, pp. 394-397, doi: 10.1049/cp:19971212.

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