

## ABSTRACT

Flight planning has an important role in the operation of an airline. Usually the airlines make flight planning to minimize fuel used by paying attention to the selection of the route and the recommended altitude. The purpose of this study is to reduce the use of fuel burned by aircraft, by optimize the vertical navigation profile. This research will develop a search engine for 3D flight planning that use route data optimized by Dijkstra path finding algorithm and the aircraft performance data base (PDB).

Genetic algorithm was chosen as a solution to solve this problem. Genetic algorithm is a heuristic search approach that inspired by Darwin's theory of natural evolution which mimics "Survival of the fittest". A hexagon containing nodes from the resulted Dijkstra algorithm is visualized in 3D model. Initialization of population with 500 individuals is generated with 0.01 mutation rate, 100 generation, and 20 elite size. To obtain convergence value the selection of 5, 25, 50 and 100 generation is generated. And the choice of different gross weight consist of 74000kg, 70000 kg, 65000 kg, and 55000 kg is generated to be analyzed. The selection of routes will be in local area of Indonesia which are Jakarta – Tanjung Pinang, Jakarta – Makassar, and Jakarta – Manado which represent the short-haul flight, medium-haul flight, and long haul-flight respectively. Here the need of using genetic algorithm is because it search from population of routes, not a single route. The route data will be selected from the result of Dijkstra with its alternate routes. Here the fuel burn calculation is using the A320 Flight Crew Operation Manual.

The algorithm is able to find the optimal fuel burn routes with changing in altitudes. The effect of weight has a contribution in reducing the fuel burn with the factor of distance and altitudes. Overall the result shows a convergence in random generation to be the best individual with range of altitude from 35000 to 39000 ft.

*Keyword: 3D Flight planning, Fuel consumption, Performance data base, flight trajectory, Dijkstra shortest path-finding, Genetic Algorithm, Vertical navigation profile*