

# Fed up waiting on a plane to take off? Scientists may have the answer!!!!

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MSc in Big Data

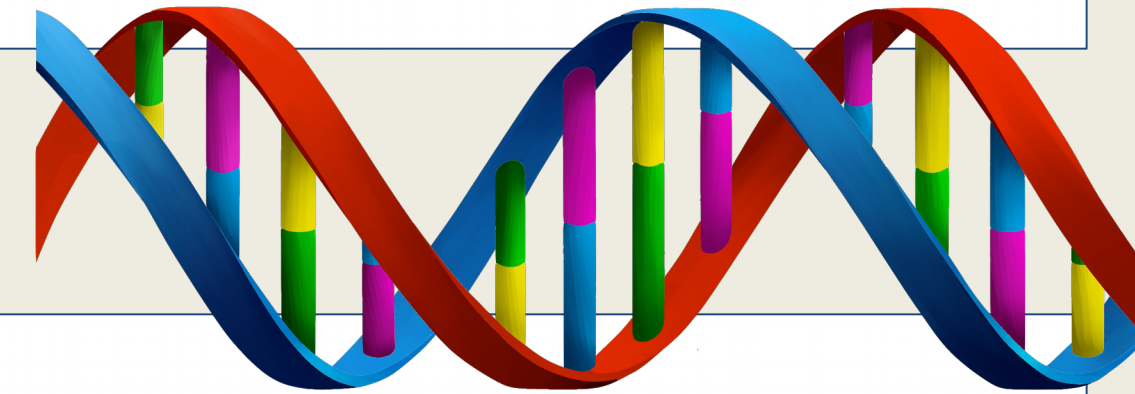
## Background

With increasing demand for air travel and overloaded airport facilities, inefficient airport taxiing operations are a significant contributor to unnecessary fuel burn and a substantial source of pollution.

Although taxiing is only a small part of a flight, aircraft engines are not optimised for taxiing speed and so contribute disproportionately to the overall fuel burn. Delays in taxiing also waste scarce airport resources and frustrate passengers. Consequently, reducing the time spent taxiing is an important investment.

A previous paper\* investigated finding the right order in which to allocate routes to the aircraft. A rolling window approach incorporating a genetic algorithm was used. The GA is able to reduce overall taxi time with respect to the other approaches.

\*"A Rolling Window with Genetic Algorithm Approach to Sorting Aircraft for Automated Taxi Routing" 2018, Dr A. E.I. Brownlee and others



## The Project

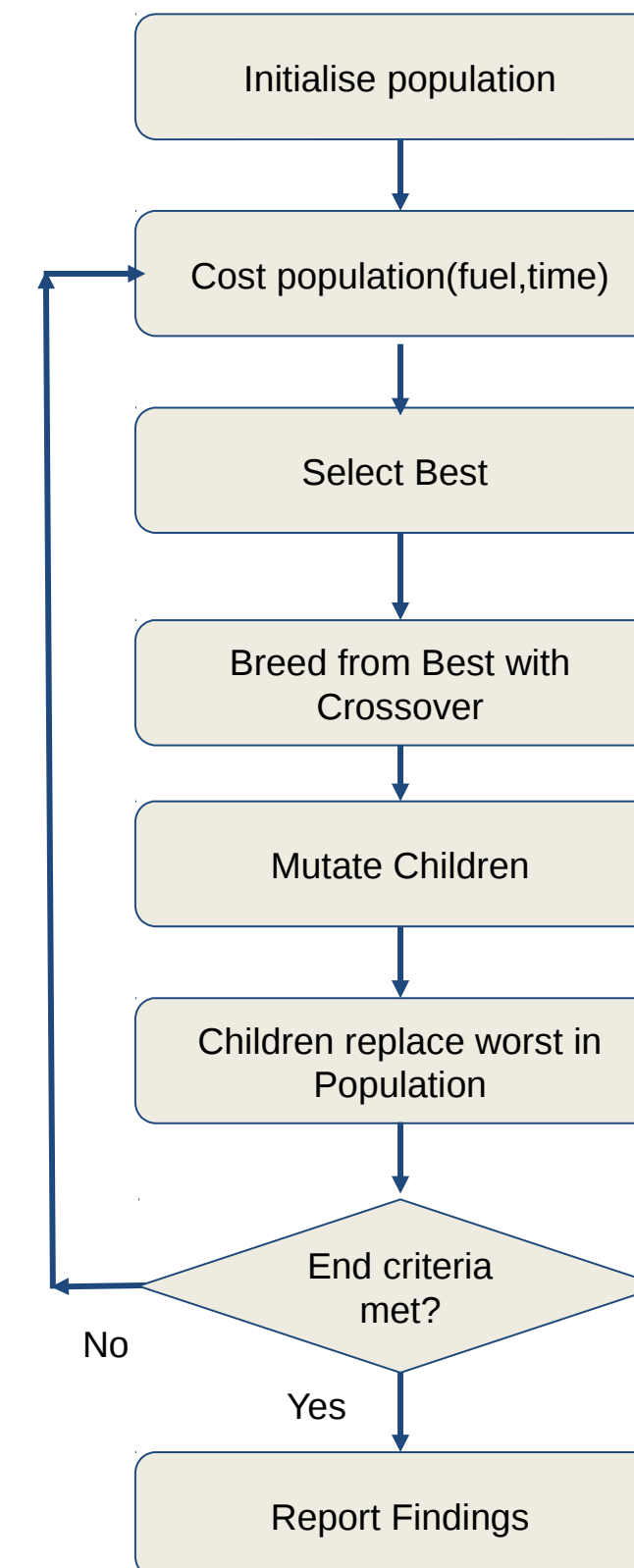
The project is examining different operators and configurations for the GA to find good results as quickly as possible.

Experiments will be run to test the approach for Hong Kong, Doha, and Beijing Capital Airports (possibly also for Manchester if the data can be obtained).

The deliverables will be a program implementing a GA for this problem, experimental results confirming its performance and a pareto front chart showing the relationship between fuel and time savings.

Python 2.7 used for GA programming.

## Genetic Algorithm



## Results so far

Introduction of multiple families and parallel processing has improved space searched / time.

Major problem has been runtime - the cost-routing function programs can take minutes to run depending on airport complexity and number of flights in the window.

Reduced run-times due to fewer calls on routing functions required to find optimal routes.