

# Evolutionary artificial intelligence and robotics

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## Abstract

Evolutionary artificial intelligence used to solve search and optimization problems, based on genetic processes of biological organisms. In this report, we have focused in some important algorithms to solve some real problems.

## 1 GitHub Repository

 <https://github.com/Harithelamin/ACIT4610-24H-G13>

## 2 Task 1

This is the introduction of the document. Here we will cite some references, for example, [1].

### 2.1 The Problem

Traffic Management Optimization Using Multi-Objective Evolutionary Algorithms.

### 2.2 dataset

### 2.3 Solution

In this task, we have applied a Multi-Objective Evolutionary Algorithm (MOEA) to optimize traffic management strategies for selected New York City (NYC) areas, in order to minimize conflicting objectives, Total Travel Time (TTT) and Fuel Consumption (FC), using real-world traffic data from NYC Open Data. The traffic management strategy has involved controlling traffic signal timings (green, yellow, and red light durations), and setting speed limits on these segments. We have developed an MOEA that optimized these parameters to achieve the best trade-off between minimizing TTT and FC.

In addition, we have used two datasets from the NYC Open Data portal, 1. NYC Traffic Volume Counts. 2. Traffic Speed Data. We have focused on

optimizing traffic management for the three road segments in New York City; 1. 5th Ave between 42nd St and 47th St (Manhattan) 2. Atlantic Ave between Flatbush Ave and Bedford Ave (Brooklyn) 3. Queens Blvd between Union Tpke and Yellowstone Blvd (Queens)

We have Identified and preprocess relevant data points, such as peak-hour traffic volumes, average speeds, and any available environmental indicators.

Calculate the peak-hour traffic

## 2.4 dataset

## 2.5 restult

The results are discussed here. For instance, the results of the algorithm described by [2] are shown in Figure 1.

	id	peak_hour	peak_hour_volume
0	422	_3_00_4_00pm	377.0
1	171	_8_00_9_00am	552.0
2	171	_8_00_9_00am	1603.0
3	171	_1_00_2_00pm	1872.0
4	171	_11_00_12_00pm	1554.0
...	...	...	...
18012	171	_5_00_6_00pm	657.0
18013	171	_5_00_6_00pm	718.0
18014	171	_2_00_3_00pm	687.0
18015	171	_12_00_1_00pm	700.0
18016	171	_1_00_2_00pm	647.0

[18017 rows x 3 columns]  
Overall peak hour: \_5\_00\_6\_00pm, Overall volume: 14465547.0

Figure 1: A sample figure.

## 3 Task 2

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## 4 Task 4

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## References

- [1] Donald E. Knuth. *The TeXbook*. Addison-Wesley, 1984.
- [2] Leslie Lamport. *LaTeX: A Document Preparation System*. Addison-Wesley, 1986.