

# Drone Collision Detection System

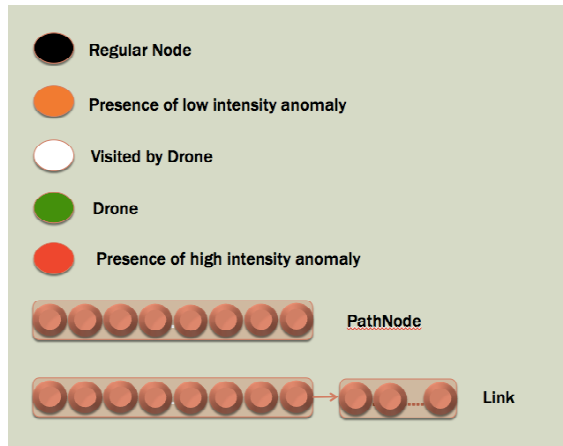
By

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## Abstract

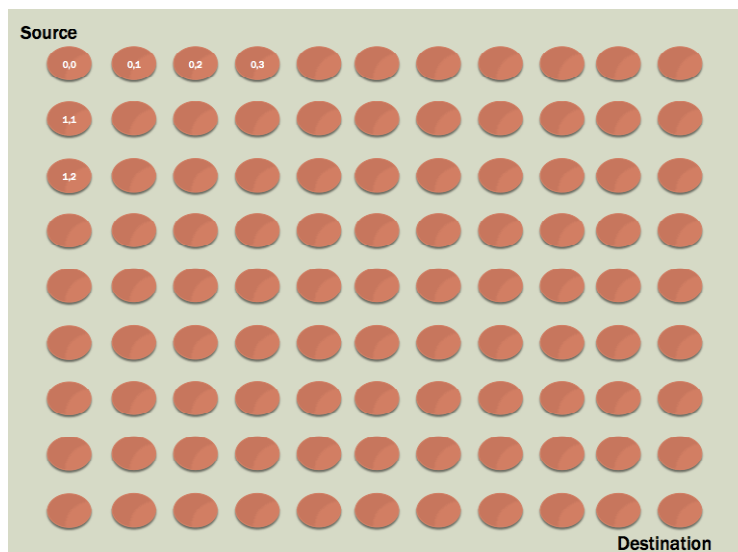
This document describes application of Machine learning algorithms in problem of Drone Collision Detection. In order to improve performance and travelling efficiency of a drone in air there is a growing emphasis on detection of anomalies in air. This system identifies anomalies and detects the best path for the drone to travel to its destination with high computational efficiency. It also helps the drone travel by a previously trained path in order to save computations of detection of path at every instance.

## Conventions



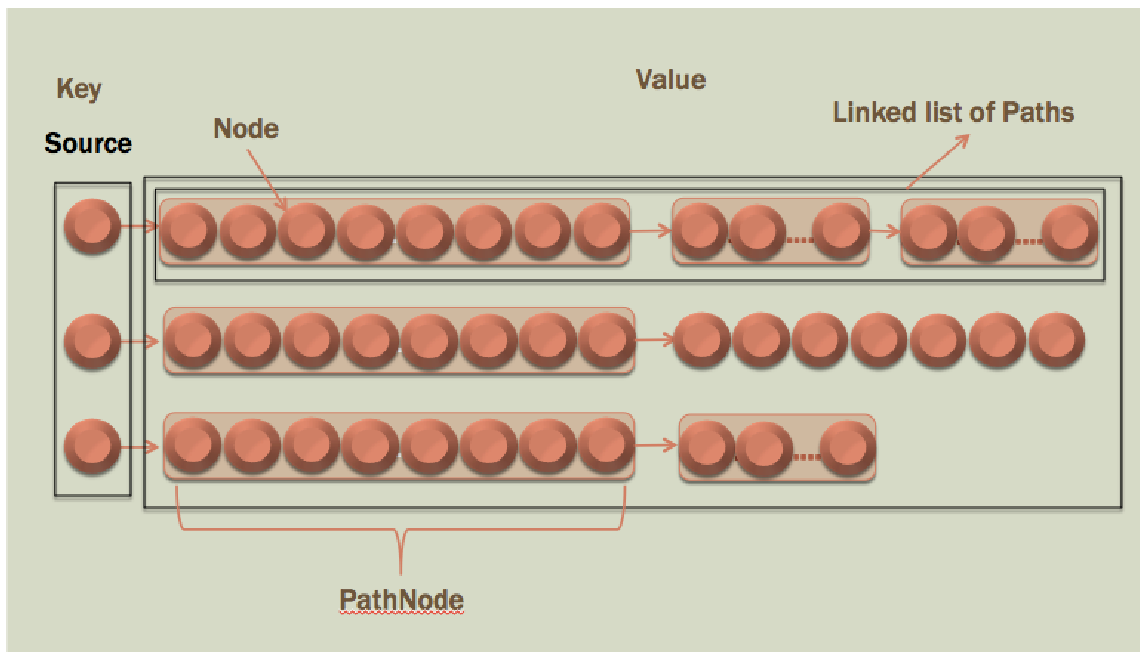
## Grid Of Travel

1. The drone's progress is traced using a grid of nodes
2. The drone is made to jump to the next node depending on the anomaly present
3. Each node's location is maintained by its x and y co-ordinates



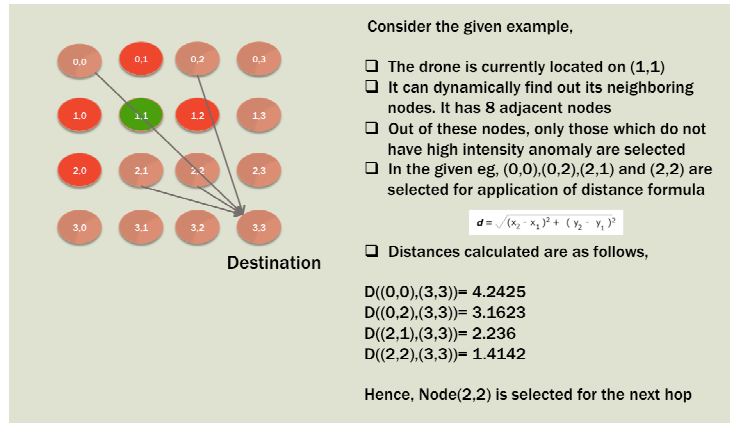
## Machine Learning Data Structure

1. The machine consists of a HashMap whose key is represented by the source node. (start of any path or start of anomaly detected path)
2. The value in the HashMap is a LinkedList of all the travelled paths, in the decreasing order of traversal count. Thus the most frequently travelled path (represented as PathNode) will be towards the beginning of the linked list.
3. While travelling, the drone will pick up the PathNode present at the beginning of the linked list against its corresponding source.



## Methodology

### 1) Travel of Drone : Nearest neighbor chaining algorithm

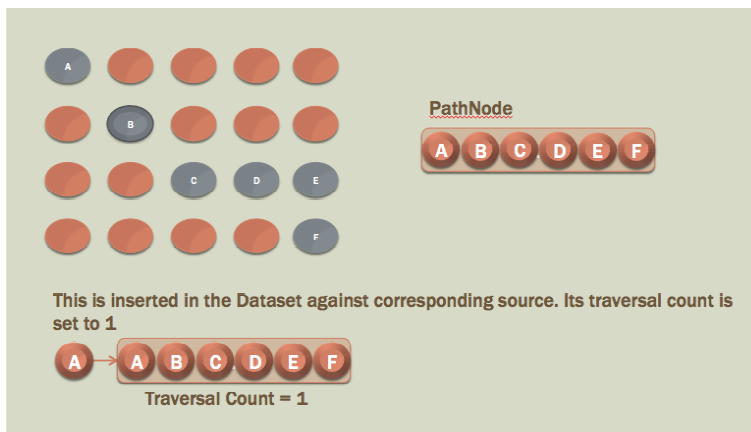


### 2) Training

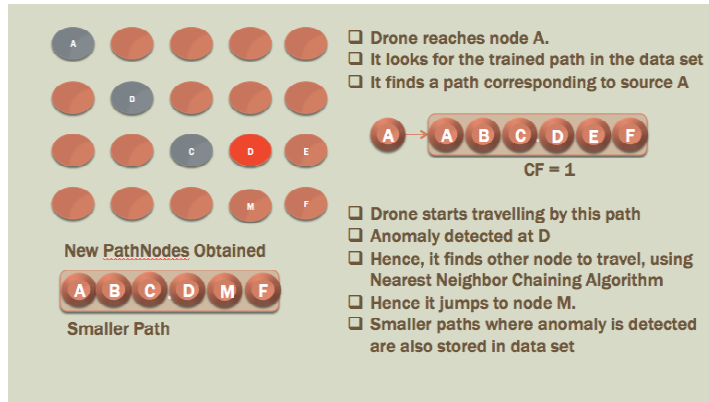
The dataset used for storing paths is a hash map. Every path stored is stored in the date set as a value in the form of a linked list corresponding to its source as a key. The linked list is arranged in decreasing order of its traversal count.

The most frequently traversed path is placed in the front in the linked list.

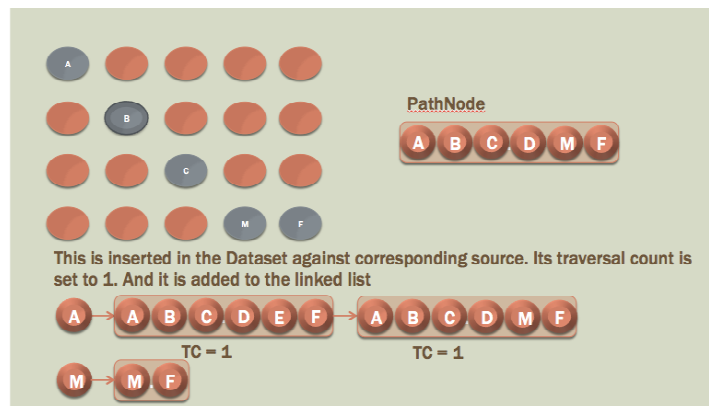
Consider the path to traversed by the node as below,



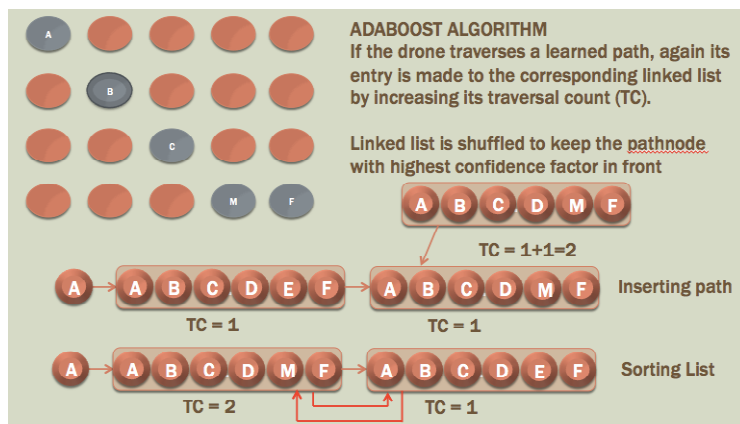
## Travelling via learned path



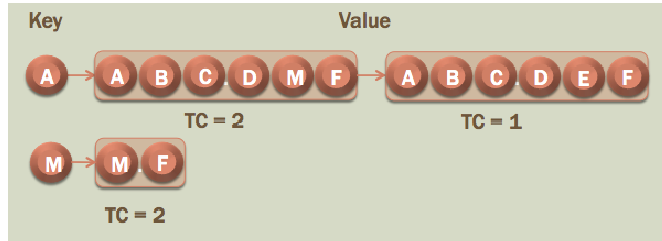
## Training next instance



## Training next instance | Adding to linked list | Sorting List

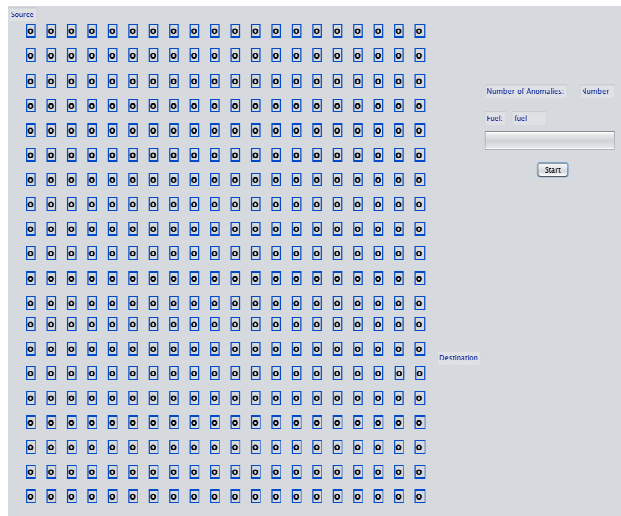


## Trained Dataset At this instance

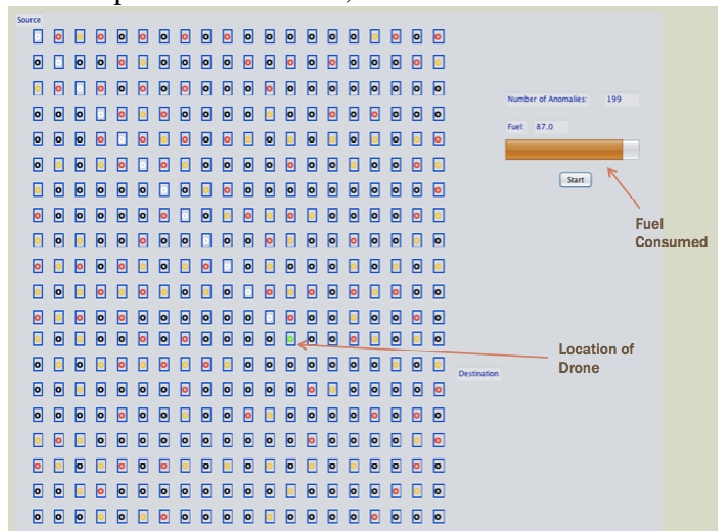


## Running The Project

- Import project into Netbeans
- Run the project using 'Run' button
- A frame containing grid of nodes will be visible.



- Hit the 'Start' button, the project will start running. Repeat hits on 'Start' button to learn path several times, after drone reaches destination.



## Drawbacks and Future Advancements

- Currently developed system can learn data for multiple sources but for a single destination
- More training is required
- Priority of selection of learned path can be based on fuel along with confidence factor.

## Conclusion and References

An effective approach to the drone collision detection system as employed.

Algorithms used are as follows,

- 1) Nearest neighbor chaining  
[http://en.wikipedia.org/wiki/Nearest-neighbor\\_chain\\_algorithm](http://en.wikipedia.org/wiki/Nearest-neighbor_chain_algorithm)
- 2) Adaboost algorithm  
<https://www.cs.princeton.edu/~schapire/papers/explaining-adaboost.pdf>
- 3) Instance based learning  
[http://en.wikipedia.org/wiki/Instance-based\\_learning](http://en.wikipedia.org/wiki/Instance-based_learning)
- 4) Weighted majority algorithm  
<https://users.soe.ucsc.edu/~manfred/pubs/J24.pdf>