

Problem Chosen

B

2024

MCM/ICM
Summary Sheet

Team Control Number

123456

Build an Army of Drones to Fight Wildfires

Summary

Keywords:

Contents

1	Introduction	3
1.1	Problem Background	3
1.2	Restatement of the Problem	3
1.3	Literature Review	3
1.4	Our Work	3
2	Assumptions and Explanations	4
3	Notations	4
4	Model Preparation	5
4.1	Data Overview	5
4.1.1	Data Collection	5
4.1.2	Data Screening	5
5	XX model based on XX algorithm	6
5.1	The first model	6
5.1.1	First step in modelling	6
5.1.2	Second step in modelling	6
5.2	The second model	6
6	Sensitivity Analysis	6
7	Strengths and Weaknesses	6
7.1	6
7.2	6
	References	7
	Memorandum	8
A	Appendix:1	9
B	Appendix:2	9

1 Introduction

1.1 Problem Background

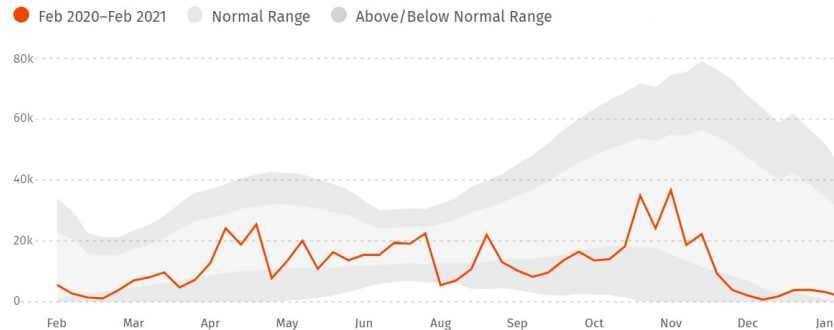


Figure 1: Fire Situation in Australia (Feb 2020 - Feb 2021)

1.2 Restatement of the Problem

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1.3 Literature Review

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1.4 Our Work

The problem requires us to fight fires by optimizing the locations of two type of drones. Our work mainly includes the following:

- 1.
- 2.
- 3.

In order to avoid complicated description, intuitively reflect our work process, the flow chart is shown in Figure :

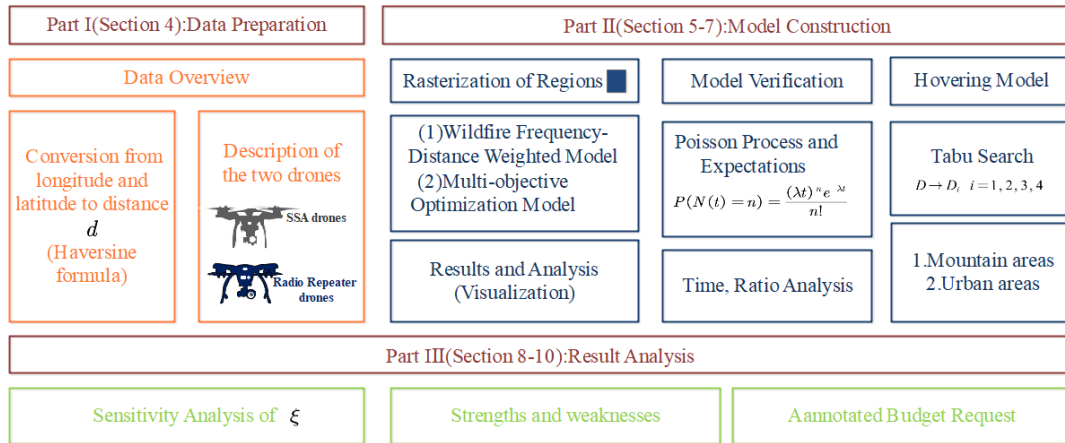


Figure 2: Flow Chart of Our Work

2 Assumptions and Explanations

Considering that practical problems always contain many complex factors, first of all, we need to make reasonable assumptions to simplify the model, and each hypothesis is closely followed by its corresponding explanation:

Assumption 1:

Explanation:

Assumption 2:

Explanation:

Assumption 3:

Explanation:

Assumption 4:

Explanation:

Additional assumptions are made to simplify analysis for individual sections. These assumptions will be discussed at the appropriate locations.

3 Notations

Some important mathematical notations used in this paper are listed in Table 1.

Table 1: Notations used in this paper

Symbol	Description
x_i	Longitude within the i-th Wildfire Grid
y_i	Latitude within the i-th Wildfire Grid
Ω_i	The area of the i-th grid
d_{ki}	the distance d_{ki} between the k-th roaming grid and the i-th grid
SC_k	Score for evaluating the k-th wildfire grid
$x_{ki}^{(\alpha)}$	the SSA_α drone sent by the k-th EOC to the i-th wild-fire grid
$x_{ki}^{(\beta)}$	the RR_β drone sent by the k-th EOC to the i-th wildfire grid
t_{fly}^δ	The flight time of drones

*There are some variables that are not listed here and will be discussed in detail in each section.

4 Model Preparation

4.1 Data Overview

4.1.1 Data Collection

The official website of FEC in Victoria, Australia was queried and lots of data about wildfires were obtained. And other data sources are shown in Table 2.

Table 2: Data and Database Websites

Database Names	Database Websites
Fire Alerts	https://www.globalforestwatch.org/map/
Altitude	https://search.earthdata.nasa.gov/search
Latitude and Longitude	https://www.kaggle.com/carlosparadis/
Google Scholar	https://scholar.google.com/
Maps	© 2021 Mapbox © OpenStreetMap

4.1.2 Data Screening

- 1.
- 2.
- 3.

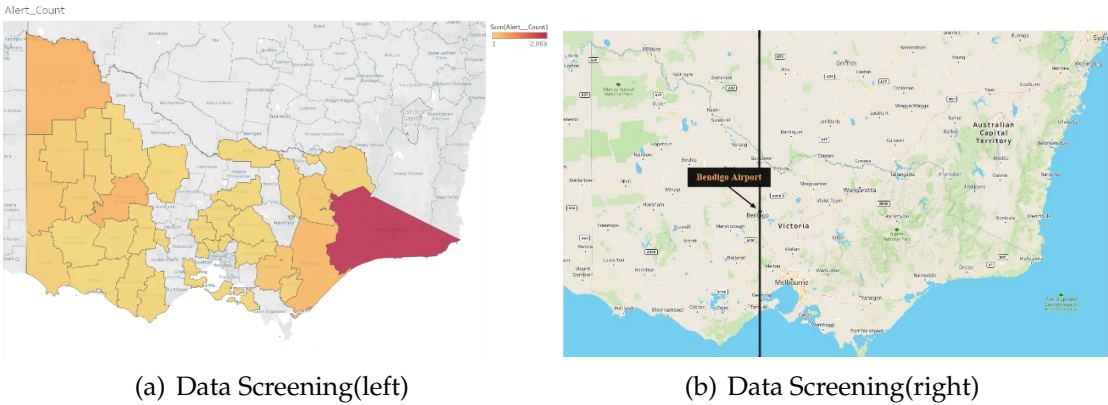


Figure 3: Data Screening

5 XX model based on XX algorithm

5.1 The first model

5.1.1 First step in modelling

$$E = mc^2$$

(1)

- XXX 1:
XXX 2:
XXX 3:

5.1.2 Second step in modelling

5.2 The second model

6 Sensitivity Analysis

7 Strengths and Weaknesses

7.1

-
-
-

7.2

-
-

References

[1]

[2]

[3]

[4]

[5]

Memorandum

To: xx

From: Team XX

Date: January 22nd, 2024

Subject: Your Subject Here

A Appendix:1

```
1 #Sample code
2 import pandas as pd
3 import numpy as np
4
5 # Get the two numbers entered by the user
6 num1 = float(input("Please enter the first number: "))
7 num2 = float(input("Please enter the second number: "))
8
9 # Calculate the sum of two numbers
10 result = num1 + num2
11
12 # Output results
13 print(f"{num1} + {num2} = {result}")
```

B Appendix:2