Problem Chosen	2024 ICM Summary Sheet	Team Control Number
E		number

Sustainability of Insurance under Natural Disasters Caused by Climate Change

Summary

With the emergence of various extreme climates,**Austral-ia's wildfires**

Several models are established:

For Model I: Firstly,We find data... Then,we establish **model**... Next,we use Algorithm... Finally,it can be seen that ...

For Model II: Firstly,We find data... Then,we establish model... Next,we use Algorithm... Finally,it can be seen that...

Finally, sensitivity analysis ... Meanwhile, robustness

Contents

1 Introduction

1.1 Problem Background

Extreme-weather events are becoming a crisis for property owners and insurers. The world has endured "more than $1 trillion in damages from more than 1,000 extreme-weather events in recent years." The insurance industry saw claims for natural disasters in 2022 increase by "115% compared to the 30-year average." Conditions are expected to get worse as losses from severe weather-related events are likely to increase due to floods, hurricanes, cyclones, droughts, and wildfires. Premiums for insurance coverage are rising quickly, with climate change fueling projected increases of 30-60% by 2040.

Property insurance is not only getting more expensive, but also harder to find, as insurance companies change how and where they are willing to underwrite policies. The weather-related occurrences propelling the cost of property insurance premiums look different depending on where you are in the world. Additionally, the insurance protection gap averages 57% worldwide and is increasing. This highlights the industry's dilemma - the emerging crisis in profitability for the insurers and in affordability for the property owners.

1.2 Problem Restatement

Four major problems are discussed in this paper, which are:

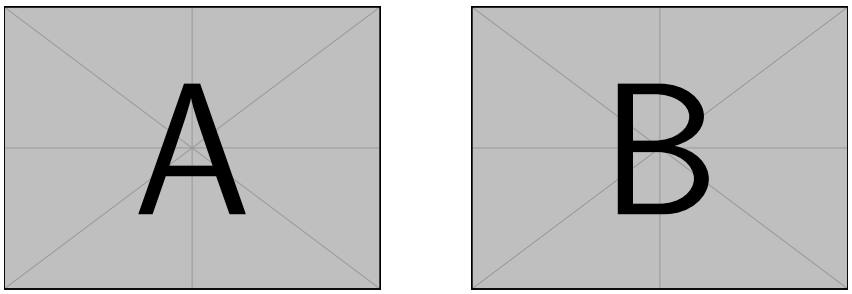
- determine whether the insurance model should be covered in areas where the frequency of natural disasters increase.
- use the previous insurance model to guide real-estate and offer appropriate services to growing communities and populations.
- measure a historic building and allocate conservation energy based on cultural, historical, economic and community significance.
- need to write a letter which contains both future plan, schedule and cost, based on the Insurance Model and the Value model

A literatrue[1] says something about this problem ...

1.3 Our work

We do such things ... 这部分直接上图

美赛一定要多上图，清晰直观，并且格式上最好是矢量图，例如 pdf，而不是位图，例如 jpg，png 等，在形式上最好是组图，下面列出了利用`subfigure` 实现的 `1x2,1x3,2x2` 的几种组图：



(a) left (b) right

Figure 1: Two images

Figure 1 gives an example of subfigures. Figure 1a is on the left, and Figure 1b is on the right.

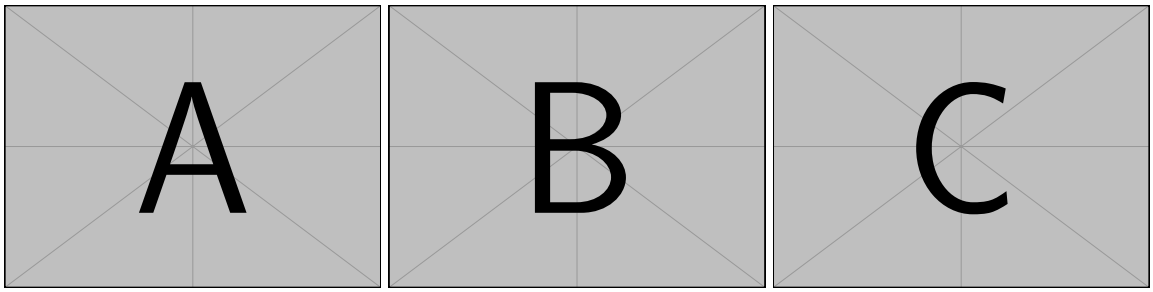
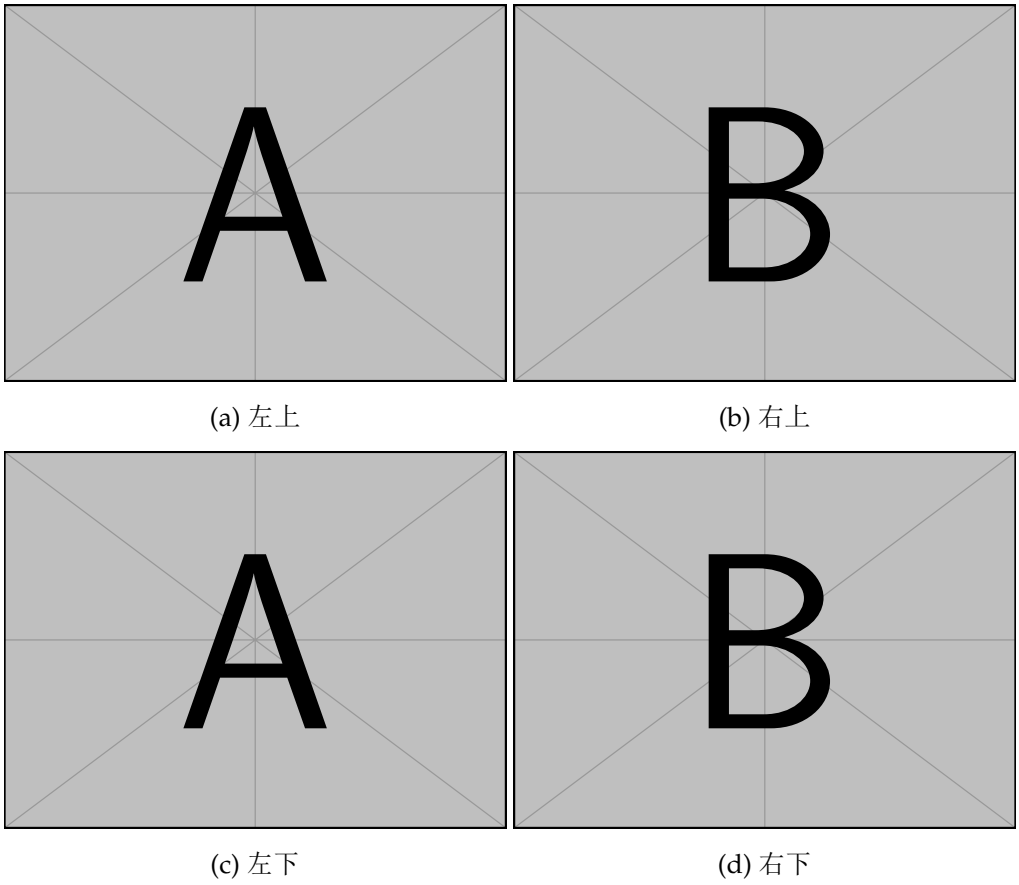


Figure 2: Three images

1. We do ...

2. We do ...

3. We do ...



(a) 左上 (b) 右上

(c) 左下 (d) 右下

Figure 3: 组图组图变变变

2 Preparation of the Models

2.1 Assumptions and Explanations

To simplify the problem, we made the following assumptions, each of which has a corresponding reasonable explanation.

- ***Assumption 1:*** 假设
  ↪ ***Explanation:*** 理由
- ***Assumption 2:*** 假设
  ↪ ***Explanation:*** 理由
- ***Assumption 3:*** 假设
  ↪ ***Explanation:*** 理由
- ***Assumption 4:*** 假设
  ↪ ***Explanation:*** 理由

Additional assumptions are made to simplify analysis for individual sections. These as-

sumptions will be discussed at the appropriate locations.

2.2 Notations

Table 1 lists some important mathematical notations used in this paper.

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}
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

*Some variables are not listed here and will be discussed in detail in each section.

2.3 Data

2.3.1 Data Collection

Websites, where we collect data, are listed in Table 2.

Table 2: Notations used in this paper

Database Names	Database Websites
Google Scholar	https://scholar.google.com
Wikipedia	https://www.wikipedia.org
wolframalpha	https://www.wolframalpha.com

2.3.2 Data Processing

3 Probelm

3.1 Probelm 1

3.1.1 Under what conditions should insurance companies underwrite policies?

1. Risk Assessment
Risk assessment is a core activity for insurance companies, involving the process of identifying, analyzing, and evaluating potential risks. For extreme weather events, this process is particularly complex due to the uncertainties brought about by climate change. Using technical methods and mathematical models to deal with the dynamic assessment risk of existing data.

2. Pricing Strategy
A dynamic pricing strategy allows insurance companies to adjust premiums based on the results of risk assessments or other conditions while a relatively stable price is necessary to establish a reputation.

3. Risk Diversification
Insurance companies can spread their underwritten risks, reducing the potential for significant losses from a single disaster event.

4. Collaboration
Facing the challenges posed by climate change requires insurance companies to collaborate with governments, businesses, and non-governmental organizations.

Through these detailed measures, insurance companies can more effectively manage the risks posed by extreme weather events while ensuring the sustainable development and long-term profitability of their business.

3.1.2 Details about Model 1

The detail can be described by equation (2):

$$\frac{\partial u}{\partial t} - a^2 \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) = f(x, y, z, t) \tag{1}$$

3.2 Probelm 2

3.2.1 Details about this question

The detail can be described by equation (2):

$$\frac{\partial u}{\partial t} - a^2 \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) = f(x, y, z, t) \tag{2}$$

3.3 Problem 3

3.3.1 Conclusion of Model 2

The results are shown in Figure 4, where t denotes the time in seconds, and c refers to the concentration of water in the boiler.

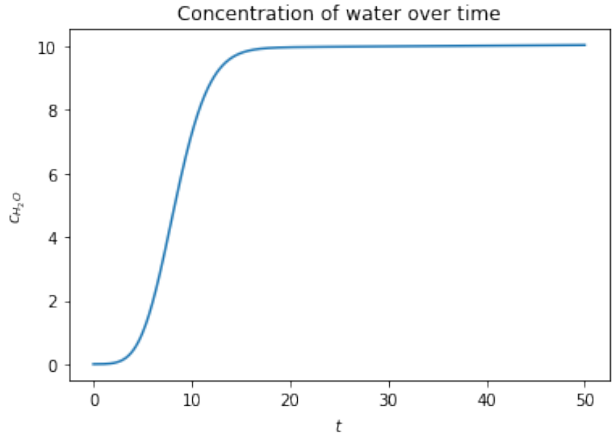


Figure 4: The result of Model 2

伪代码，默认样式为隐藏行号的三线表形式的伪代码

Algorithm 1: How to write algorithms

Input: 输入

Output: 输出

initialization;

while *not at end of this document* **do**

    read current;

    repeat

        do these things;

    until *this end condition*;

    if *understand* **then**

        go to next section;

        current section becomes this one;

    else

        go back to the beginning of current section;

    do

        do these things;

    while *this end condition*;

3.3.2 Commetary on Model 2

The instance of long and wide tables are shown in Table 3.

Table 3: Basic Information about two Main Continents

Continent	Description	Information
North America	1	2
Asia	3	4

4 Test the Model

4.1 Sensitivity Analysis

4.2 Robustness Analysis

这部分很重要，不能缺！

5 Conclusion

5.1 Summary of Results

5.2 Strengths

- The sensitivity analysis of the model demonstrates the effectiveness of the model under different parameter combinations and prove the robustness of the mod
- Second one ...

5.3 Weaknesses and Improvements

- The analysis of ... can be more accurate if we have more complete data;
- 123

letter

To: a historic landmark
From: Team Number
Date: February 5, 2024
Subject: a letter to the community recommending a plan, timeline, and cost proposal for the future of their treasured landmark

the contents of the letter...

References

[1] Helmut Kopka and Patrick W Daly. *Guide to LATEX*. Pearson Education, 2003.

Appendix A: something

Appendix B: Program Codes

Here are the program codes we used in our research.

code/example.py

```python
# Python code example
for i in range(10):
    print('Hello, world!')
```

code/example.m

```
% MATLAB code example
for i = 1:10
    disp("hello, world!");
end
```