Experience in MCM2022

Zhirong Chen, Ziyuan Chen

ZJUI Institute

2023/2/10

Contents

Zhirong Chen, Ziyuan Chen

- ▶ Preparation

- ▶ During the Contest

- ▶ Paper Writing

Introduction

Prizes

给大家普及一下美赛奖项的设置
u奖 unbelievable. 令人难以置信的好(特等奖)
s奖. super 超级好(特等候选)
h奖 honor 光荣的(一等奖)
M奖 master 熟练的(高于平均水平)
F奖 finish. 完成的(成功参赛)
O奖 out. 出局(未成功参赛)

滑而不稽则罔

稽而不滑则殆

预祝各位参赛选手比赛顺利，取得U奖！

Introduction

Capacity

Zhirong Chen,
Ziyuan Chen

- ► Team Working
  - ► Tip: $80\% + 20\%$
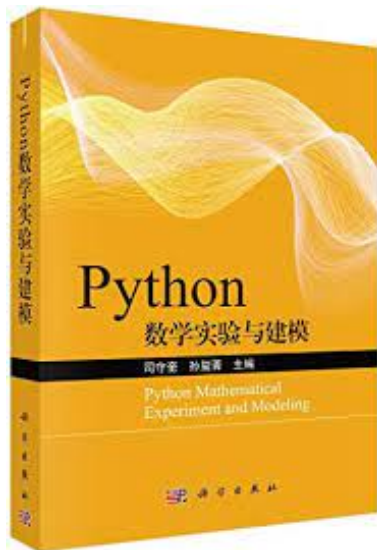
- ► Mathematical Thinking

- ► Paper Writing

Preparation
What should you do?

1. Read through any mathematical modeling book
   - *Python Mathematical Experiment and Modeling*
   - "Writing the MCM paper correctly"
   - ...
2. Useful python libraries
   - **Data Processing:** pandas, statsmodels
   - **Modelling:** scipy, sympy
   - **Machine Learning:** sklearn, pytorch
   - **Data Visualization:** matplotlib, seaborn
3. Try to learn LaTeX

Recommended Book

Preparation

Zhirong Chen, Ziyuan Chen

What's next?

1. Traditional Modelling Algorithms
   - ▶ analytic hierarchy process
   - ▶ PCA (principal component analysis)
2. Advanced Modelling Algorithms
   - ▶ ant colony algorithm
   - ▶ genetic algorithm
3. Paper Writing Skill

Attention: Don't use too many neural networks in your model, because

1. they usually don't have good interpretability
2. sometimes they are not suitable for the data

During the Contest
The Three Pillars

Zhirong Chen,
Ziyuan Chen

- ▶ Modeling
- ▶ Coding
- ▶ Writing

- ▶ Be sure to help each other out
- ▶ ...

During the Contest
Our solution

- **Ziyuan Chen:** Prediction, *Visualization*, Paper Writing
- **Zhirong Chen:** Decision I (CAPM), *Parameter Tuning*
- **Zicheng Ma:** Decision II (LinProg), *Sensitivity Analysis*

- Be sure to help each other out
- and be **prepared** to help each other out

During the Contest

Prepare for the unexpected

- ▶ We don't know much about *finance*
  - ▶ or technically every possible topic

- ▶ When data runs out (yeah, it happens)
  - ▶ and **37%** of all teams choose the same problem......

Paper Writing

Zhirong Chen, Ziyuan Chen

- ▶ LaTeX is **good**.
  - ▶ It helps to have an expert.

- ▶ Beautiful formatting is **good**.
  - ▶ Make use of templates and packages.
  - ▶ It's not AAAI or IEEE, but there's a mcmthesis

- ▶ Graphs are **good**.
  - ▶ Think twice, though.

- ▶ Teamwork is the **best**.
  - ▶ Everyone should contribute. Everyone.

Zhirong Chen,
Ziyuan Chen

Takeaway Points

- **Be diverse.** Why not try it out?
    - ARIMA, GM, MLP, CAPM, LinProg, AHP......
- **Be structured.** Feel good about your product.
    - Prediction + Decision
- **Be specific.** Your model doesn't work for all.
    - Long/short term, #sample, etc.
- **Be considerate.** Mind the details.
    - e.g. What data will we have *in the future*?
- **Be creative.** Think more and stand out.
    - "Eyesight" and "risk tolerance" in our case

Additional Resources

https://github.com/AllenHeartcore/MCM2022_2214713