Perspectives on Student's Mathematical Approaches for the "B Problem" (Discrete) of COMAP's Mathematical Modeling Contest

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Abstract

COMAP's Mathematical Contest in Modeling (MCM) always includes a problem focused on discrete mathematics — the "B Problem." After summarizing recent contest problems, we will discuss student approaches that have been used and offer insights from Final Judges.

Outline

Contents

Recent B Problems

2019
Send in the Drones

2018
How Many Languages?

2017
Merge After Toll

2016*
Space Junk

2015
Searching for a Lost Plane

2014
College Coaching Legends

2013
Water, Water, Everywhere

2012
Camping along the BL River

Complete Contest Problem & Results Matrix:1985–2019

Main Student Approaches

The Main Student Tools

- Explicit Discrete/Combinatorial Model

- An Algorithm Developed for the Problem

- Simulations to Generate Results

The B Problem Paper

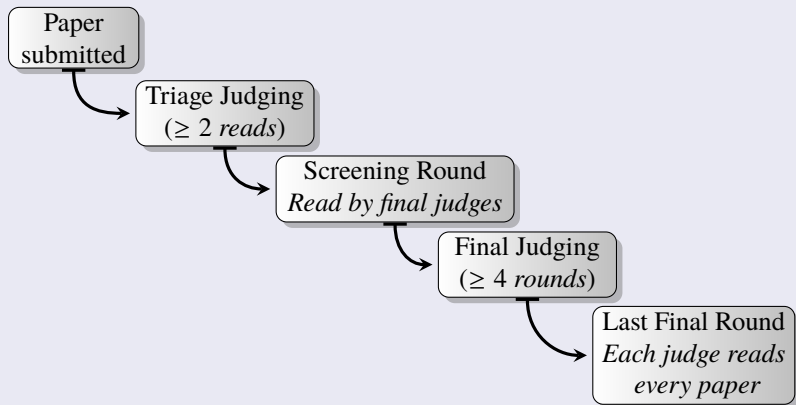## The Standard Structure of a B Problem Paper

- Executive Summary
- Background
- Assumptions with Justifications
- Narrative
  - Model / Algorithm / Simulation
  - Results
  - Sensitivity Analysis
  - Strengths & Weaknesses
- One or two page summary of results for lay-audience
  (often required in a specific format)
- References

COMAP's "Contest Instructions" has links to LaTeX and MS Word templates.

Judging the B Problem

Paper Flow

Paper submitted

Triage Judging
(≥ 2 *reads*)

Screening Round
Read by final judges

Final Judging
(≥ 4 *rounds*)

Last Final Round
Each judge reads every paper

Judging is not *grading*, it's *ranking* (≈ *a distributed bucket sort*).
If you'd like to be an MCM Triage judge, please contact me.

Judges' List of Critical Paper Parts

The Top Scoring Papers have:

1. A well-written Executive Summary with **specific results**
2. Assumptions that are clearly stated with **justifications**
3. The Narrative . . .
   1. shows **development** of the model/algorithm/simulation
   2. provides model analysis
   3. includes **sensitivity analysis** of important parameters
   4. identifies the model's strengths & weaknesses
4. Typically requires a "Short Report to Lay-Person" (1-2 pg)
5. Relevant references with **proper attribution** throughout
6. *Good writing!*

The UMAP Journal has judge's commentaries & outstanding papers

MCM 2019 is February 13-17, 2020

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