Judge's Commentary:
The Ben Fusaro Award for 2015

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Introduction

The Ben Fusaro Award honors the Founding Director of the MCM (who continues to serve as a judge for the contest). First awarded in 2004, it recognizes an entry for an "especially creative approach" to the discrete problem in the contest.

The Fusaro Award for 2015 goes to the Outstanding team from Central South University, Changsha, China. Their paper, one of the top group of papers designated as Outstanding, stands out for a remarkably improved model and detailed analysis.

Problem Statement

The world medical association has announced that their new medication could stop Ebola and cure patients whose disease is not advanced. Build a realistic, sensible, and useful model that considers not only the spread of the disease, the quantity of the medicine needed, possible feasible delivery systems, locations of delivery, speed of manufacturing of the vaccine or drug, but also any other critical factors your team considers necessary as part of the model to optimize the eradication of Ebola, or at least its current strain. In addition to your modeling approach for the contest, prepare a 1–2 page non-technical letter for the world medical association to use in their announcement.

My Comments

Here are my comments on the paper, organized by the categories deemed appropriate for this problem by the judges, who gave the most credit for model development, analysis/validation, and conclusions.

Summary

As always, a strong summary is essential. The summary sets the scope and conclusions of the paper. This summary presents a good overall plan for the paper, listing in detail the models and considerations of the team. Some conclusions or calculated results would improve the paper even more.

Format, Clarity, Writing

An important component of papers is the writing style. Papers should be easy to read with correct English grammar. Although variation in the nouns, verbs, and adjectives used is understandable, correct use of noun verb relationships is necessary. Tables and graphs should be labeled and described in the text. This paper does an adequate job in its writing style. More notably, its tables and graphs are referenced and explained in great detail. They provide important analysis of simulations and listing of results.

Assumptions

The assumptions are well-thought-out and reasonable. Additional justification in some instances would show the reader why the assumption is needed.

Model Development

Model development is an outstanding achievement of this paper. The improvements to the SEIR model in the presentation of the SEIIR model with intervention and with medication are outstanding. The models are presented clearly and not rushed into. The variables and equations are not thrown at the reader without explanation as with most other papers, but rather defined and described before being stated.

The table and graphs are also explained well. They illustrate the analysis and results of models. Projected values from models can be easily compared with actual data. Graphs or pictures included from other sources should be denoted with the appropriate resource.

Sensitivity Analysis

The paper includes extensive analysis of several parameters in their model, which is more than almost all entries. This analysis shows that the team has full understanding of their models. This leads to reasonable listing of strengths and weaknesses.

Strengths/Weaknesses

The paper concludes with a collection of relevant observations. It is clear that with more time and effort the models could be expanded to encompass many more features such as treatment centers at locations other than capitals. But still this paper is a remarkable achievement for a few days' work.

About the Author

Dr. Fitzkee is the Professor and Chair of Mathematics at Francis Marion University in Florence, South Carolina. He has been a national judge for the MCM for two years and the HiMCM since 2009. He is a member of the MAA Minicourse Committee since 2011 and was coordinator of the Francis Marion Undergraduate Mathematics Conference in 2004–06.