Project Work Statement

Sponsor

Blue Jays Unlimited

Modeling and Simulating Fan Participation at Large Scale Sporting Events

Participants

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Date: October 25, 2012

Any apparent association of this work to Blue Jays Unlimited is fictional one, and the sole purpose of this work is a class exercise.

1 Background

Blue Jays Unlimited (BJU), established in 1995, is a volunteer group of alumni, friends and staff dedicated to supporting and promoting Johns Hopkins athletics [1]. BJU is the official booster club for Johns Hopkins athletics and has more than 3000 active members, who have raised more than $4 million in funds to improve the Johns Hopkins athletic experience for both student athletes and fans alike [1]. These funds provide money for capital projects as well as scholarship and operational endowments [1]. BJU is present at nearly all major Johns Hopkins sporting events to encourage fans to support their Blue Jays in a vociferous and family-friendly manner to propel their Hopkins' teams to victory. It is their goal to provide Johns Hopkins' athletic teams with the ultimate advantage: a spirited home crowd.

2 Problem Statement

A loud and supportive home crowd is the ultimate home team advantage for any collegiate sports team. As such, maximizing fan participation in events such as chanting the school fight song, waving a rally towel, or doing the wave is greatly desired. These events will hence be collectively termed 'cheering'.

BJU is interested in maximizing the amount of fan participation in cheering at sporting events held on Homewood Field at the Homewood campus of Johns Hopkins University in Baltimore, MD. More specifically, they believe that they can increase fan participaton in cheering events by strategically placing volunteer 'cheer starters' in the home crowd to lead and urge other fans to participate in these cheering events.

3 Objectives

Our task is to provide BJU with a simple model as well as simulation results from the model which determine if their belief about cheer starters is accurate. Furthermore if this belief is true, we will try to provide BJU with more details about the quantity and location at which these cheer starters should be placed within the home crowd at Homewood Field in order to maximize fan participation.

Consider the satelite image of Homewood Field in Figure 1 courtesy of Google Maps. Homewood Field's capacity is approximately 8500 spectators [2]. The long

Figure 1: Homewood Field located on the Homewood Campus of Johns Hopkins University in Baltimore, MD. The bleachers in the lower left corner are traditionally where the home team's fans sit.

rectangular section of bleachers in the lower left of portion of the image seats approximately 4000 fans and is traditionally reserved for Blue Jays' fans. For nearly all major Hopkins' sporting events, these home team bleachers are filled to capacity. As such, BJU is specifically interested in maximizing the fan cheering in these home team bleachers.

4 Approach

We will develop a stochastic model which uses several parameters to determine whether a single fan will participate in cheering. These model parameters will account for the number of other fans seated around a given fan that are cheering as well as the given fan's innate level of support of the team. The more people surrounding a fan who are cheering and the greater the level of the fan's support of the team, the more likely the fan will join in the cheering. This model for a single fan will be stochastic in the sense that the support level for the team will be randomized between fans. This more accurately reflects reality where different fans can have different levels of support for the same team.

By repeatedly employing this single fan model, we can simulate a large crowd of fans seated in a spatial arrangment similar to the home team bleachers at Homewood Field and create a multi-fan model. Due to computational limits, we will downscale Homewood Field and model a home crowd of between 100-1000 fans. We will run this multi-fan model successively for multiple cycles; each cycle will represent a new time point after the initial start of the cheering and will show how many more fans have begun cheering at that given time point. At the end of the cycles, we will calculate the total percentage of fans who have joined in the cheering. Using Monte Carlo methods we will repeatedly run this procedure to get an average percentage of fan participation for a given cheer starter setup. If time permits we can then repeat these Monte Carlo simulations for various cheer starter setups to determine if there are any patterns in setups which maximize fan participation.

The model will be coded using MATLAB R2009b. Computations will be performed on a Intel Core i7 desktop PC.

5 Milestones

We have the following major deadlines:

- Work Statement due date, Sep 28, 2012.
- Midterm Presentation due date, Oct 17, 2012.
- Progress Report due date, Oct 26, 2012.
- Final Presentation due date, Nov 16, 2012.
- Final Report due date, Nov 30, 2012.

6 Deliverables

6.1 From Team to Sponsor

The following outputs are expected from this project:

- MATLAB R2009b and R combination package which simulates cheering. The main simulation code will be written in MATLAB. All documentation for the MATLAB code will be done in R. We will also provide MATLAB scripts that can be used to reproduce our numerical and simulation test

results. If we do not finish learning the necessary R documentation code in class by Novemeber 9, we will provide documentation in an appropriate alternative method.

- If time permits, a list of patterns of cheer starter setups (i.e. number of cheer starters and location of them) that maximize fan cheering.
- Technical report and presentations summarizing the work.

6.2 From Sponsor to Team

In order for our project to be successful, we will need:

- Timely responses to inquiries

References

[1] Blue Jays Unlimited - Johns Hopkins Official Athletics Site. http://www.hopkinssports.com/bluejays-unlimited/. Accessed: 10/12/2012.

[2] Homewood Field. http://en.wikipedia.org/wiki/Homewood_Field. Accessed: 10/12/2012.