**Request for Student**

**Wayne Larsen & Ross Larsen**

**Interested parties should contact Wayne Larsen (larsenbyu@yahoo.com)**

This will be paid research, up to 300 hours winter semester and beyond. Class credit is also available. The student will be included on any publications that result. The student duties in this research would include the following:

* Programming in R for some of the data entry and maximization procedures.
* Identifying and inputting another data example or two. See description below of the project. This will include some simulations on a situation where the team strengths are known.
* The student may also use R, Excel or some other medium to display results of this research.
* You will be paid and added as an author on the eventual publication

Beginning in 1979 Wayne Larsen and two graduate students developed a mathematical procedure for “The Ranking of Teams Competing in Pairwise Comparisons.” The two theses (see below) describe a Bayesian procedure which ‘ranks’ sports teams. The ranking system works for any sport (football, basketball, chess, etc.) for which any completion is between two teams. However, the system can be used in any situation where there are pairwise comparisons. In fact the procedure has been used to rank employee’s performances at a large corporation. For this proposal we use sports terminology, but the results of this research can be used in a wide variety of non-sports applications.

The procedure was given the name LARC – Larsen-Allen-Ranking-by-Computer. Andy Allen was the first Master’s student to work on the system.

LARC’s starts out with the assumption that each team has a strength, Si. LARC incorporates a prior for Si (I = 1, 2…t) where t is the number of teams. The present LARC system uses the Bradley-Terry model for its **conditional distribution.**

Probability that team i beats team j = {Si  / ( Si  + Sj )}

Given a set of n games between the t teams, LARC then maximizes the posterior distribution of Si (i = 1, 2,…t)

The principle purpose of this research is to compare the present version of LARC described very briefly above with another system in which the **conditional distribution** is given by the so-called Mosteller model:

Probability that team i beats team j = F( Si + Sj ) where F is the cumulative standard normal distribution.

We would then have two ranking systems. We want to compare the two systems to determine which conditional distribution seems to best correspond to reality.

We play on using data from the 2015-2016 NBA season as one example.

Allen, Andrew S., “The Ranking of Teams Competing in Pairwise Comparisons” Master Thesis Statistics BYU 1979

Eggett, Dennis L., “Improvements in LARC, Ranking of Teams Competing in Pairwise Comparisons” Master Thesis BYU 1983