

Bachelor Final Project: Maximizing tension in round robin schedules.
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Consider a tournament with n teams (or players) that is organized according to a so-called round robin format, meaning that every pair of teams meet k times for some integer k . If $k=1$, the resulting format is called a Single Round Robin (SRR), which features $n-1$ rounds; if $k=2$, the resulting format is called a Double Round Robin (DRR), which features $2n-2$ rounds. For convenience, we assume that a match ends with a win for one of the competing teams - draws are impossible. The winner of the tournament is the team with the most wins - tie breaking rules determine a winner when multiple teams qualify. Let us further assume that for every match i vs j , a probability p_{ij} is given that specifies the probability with which team i beats team j .

Clearly, after $n-1$ rounds in an SRR ($2n-2$ rounds in a DRR), the winner of the tournament is known; however, it is conceivable that the winner of the tournament is known before the last round is played. We call the round where the champion becomes known, the deciding round. In fact, given the p_{ij} values, a schedule leads to a probability distribution specifying the probability that a round is the deciding round.

The problem is to find a round robin schedule such that the probability that the deciding round is the last round is maximum.

The goal of this Bachelor Final Project is to

- (i) investigate the literature concerning this, and related problems,
- (ii) look into analytical approaches to tackle this problem, and
- (iii) simulate the consequences of various heuristic approaches.

References:

Davari, M., D. Goossens, J. Beliën, R. Lambers, and F.C.R. Spieksma (2020), The multi-league sports scheduling problem, or how to schedule thousands of matches, *Operations Research Letters* 48, 180-187.

Goossens, D. and F.C.R. Spieksma (2012), Soccer schedules in Europe: an overview, *Journal of Scheduling* 15, 641-651.

Gotzes, U. and K. Hoppmann (2019), Bounds for the final ranks during a round robin tournament, ZIB report 19-50.