

SISBayes - Poster presentation

Roma, February 7–8, 2017

A Hierarchical Bayesian Model for Football Scores using the Bookmakers Odds

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Modelling football outcomes is gaining an increasing attention in these last years. Particularly used for this task are:

- (*) **Indirect Models** (or Model win-loss): for the probability of winning/drawing/loosing a match.
- (*) **Direct Models** (or Model scores): for the exact outcome of a match
 - Independent Poisson model
 - Negative Binomial models
 - Bivariate Poisson model

Current literature has shown that the Bayesian approach properly allows hierarchies within teams and matches.

Issue: Despite the strong connection existing between football models and the **bookmakers' betting odds**, so far no authors have used these odds for improving the fit and the predictive accuracy within the direct modelling approach.

Proposal: extend the basic **hierarchical Poisson** model for the goals y_{m1} , y_{m2} scored respectively by the home and the away team in match m

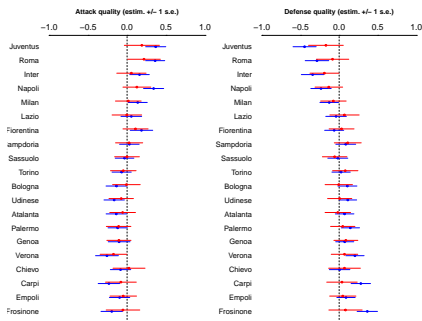
$$y_{m1} | \theta_{m1} \sim \text{Pois}(\theta_{m1}) \quad (1)$$

$$y_{m2} | \theta_{m2} \sim \text{Pois}(\theta_{m2}) \quad (2)$$

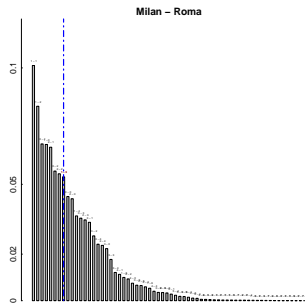
where the parameter $\theta = (\theta_{m1}, \theta_{m2})$ represents the scoring intensities for the two teams, in turn depending on some team-specific random effects, **including the bookmakers' betting odds as a further information and mixing it with historical data.**

Application: Serie A 2015-2016

We collected data from the top Italian League Serie A 2015-2016, we ran a Gibbs Sampling using the first part of the season as training set.



(a) Estimated teams-effects bars



(b) Posterior predictive distribution for a match

Preliminary results show a better predictive accuracy for our **mixture Hierarchical Poisson** model.