



Going downhill fast: The development of a rating system for Alpine downhill skiing and other multi-competitor sports

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Many games and sports, particularly races, involve outcomes in which competitors are rank ordered rather than simply a single winner being declared. An abundance of approaches exists to estimate competitor ability from rank orderings, often with the purpose of making accurate forecasts for future competitions. We propose a Bayesian state-space framework for rank ordered logit models to rate competitor ability over time. Our approach assumes competitors' performances follow independent Gumbel distributions, with each competitor's mean performance evolving over time as a Gaussian random walk. The model accounts for the possibility of ties, an occurrence that is not atypical in races in which a subset of competitors does not finish and therefore tie for last place. We demonstrate our approach to measuring abilities of 268 women from the results of women's Alpine skiing (downhill) competitions recorded over the period 2002-2013. We discuss the use of our approach in the development of a rating system for multi-competitor games.

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