Prediction of personalized ski jumping results

Background

For many, ski jumping is seen as a sport where the main objective will be to jump as far as possible. This in only part of the truth as a ski jumping competition is a point based competition based on a complex scoring system. An example of this is from the ski flying competition in Kulm in Austria the 16th of February 2020. The Norwegian Marius Lindvik jumped 242m the jump was the second longest only 0.5m behind the longest jump. Nevertheless he was placed at 13th place this round, 16.9 point behind the leader who jumped 12m shorter than him. The four variables that decide the result is a combination of jumping length, style, wind conditions and starting gate. The style of a ski jump is highly influenced by the jumping length. When jumping longer than hill size, the hill flattens out and it is extremely hard for the ski jumper to land and this highly influence the style points. By starting from a lower start gate, the ski jumper will have lower speed at the end of the inrun, which will influence the jumping length. A coach can request a gate change to a lower gate, but then the ski jumper has to jump at least 95% of the hill size to get the extra point one gets by going to a lower gate. Thus, by not jumping long enough the ski jumper will then lose speed at the end of the inrun, lose jumping meters and gain nothing.

Task

The task of this thesis will be to predict the results of a ski jumper during a competition. This will be done in close relationship with The Norwegian Ski Federation together with The Norwegian Olympic Committee. The ultimate goal will then be to make a prediction tool for the coaches that can help them decide if they should request a gate change or not for their ski jumper. Machine learning is not a commonly used tool in and to the best of our knowledge, this will be the first time machine learning will be used to analyse data in ski jumping. One master thesis from last year connecting machine learning and sports can be found here: `https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2626164`.

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Data sources

All data from each competitions the last years are available online. From the world cup, eighth seasons back to 2012 are available. One season consist of 17-20 different hills, and at every hill they have 1-3 competitions. For each competitions there will be 3 rounds (qualification, 2 official rounds). So there should be at least 900 competitions to look at fro both genders with 30-60 athletes in each competitions. Olympic games, world championship and European cup (next highest level) are also available.

The data available online will include:

- Athlete information
  - Name, nation, starting list
- Results Information
  - Total points, jumping length (length points), style points, start gate, wind compensation (average wind conditions), inrun speed
- Hill information
  - Name of hill, hill size, K-point (calculation point), gate compensation (points per gate)
- Competition information
  - Date, time for event, base values for wind, gate, length, weather conditions, air temperature, snow temperature, humidity, wind data (min, max and average wind), distance data (min, max and average jump distance), speed data (min, max and average inrun speed)

Estimation on how a gate change will influence the inrun speed in the different hills and how much this speed change theoretically will influence the jumping length under the same conditions can also be provided if needed. The Norwegian Ski Federation also has more detailed data their own jumpers from training that could be available if needed.

Contact info

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