Exploring fatigueness measurement and its effect on athletic performance
Team: MuMuMu

Goal:
Predicting a player's Fatigue rating based on workload and training sessions

Hypothesis:
SessionLoad, AcuteLoad, ChronicLoad, SleepHours, Sleep Quality are significant in predicting a player's fatigue rating

Initial Predictors:
SessionLoad, AcuteLoad, ChronicLoad, SleepHours, SleepQuality
(Predictors were normalized first and found to have close to 0 correlation with each other)

Algorithms:
The data was split into 60% training and 40% testing. We start off with Ordinary Least Square (OLS) Regression. Using OLS, we found that besides ChronicLoad, all the other predictors are significant. The Adjusted R-squared is 94.7%, so the predictors explain 94.7% of the variability. The Mean Squared Error (MSE) is 13.17 which we found to be a bit too large.
The new MSE using random forest with 20 trees is 0.851. We were able to reduce the MSE by 90% by using the random forest model to predict the fatigue rating. However we still wanted to improve this model, so we explored the players data.

Key Discovery:
Players have different training schedules with focus in different SessionTypes, and this affects their fatigue ratings differently.

New Predictors:
PlayerID, SessionType, SessionLoad, AcuteLoad, SleepQuality, SleepHours
(PlayerID and SessionType were transformed using one-hot encoding to ensure accuracy)

New Results:
Using random forest on the new predictors and 40 trees gave us MSE at 0.507. We were able to reduce the MSE by 40% from the original random forest model.

Conclusions:
PlayerID was significant when determining fatigue because these scores are subjective and will differ between each individual. This tells us we might need to categorize the Players better for determining their fatigue rating.
Acute Load is more significant than Chronic Load indicating that effort put into recent sessions have more of an impact on fatigue compared to older sessions.
Entering tournaments with less fatigue leads to more points scored. This however does not affect results when facing top teams (New Zealand and Australia).

Next Steps:
To improve the model, perform feature engineering on players so they can be categorized better.