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Managing Massive Multiplayer Online Games

SS 2019

Exercise Sheet 5: Game Analytics

The assignments are due June 05, 2019

Assignment 5-1 *Bot Detection with Bayes*

Consider an abstract game in which players regularly have to make decisions (e.g., whether to go south, north, east or west). We assume that there are always four alternatives $\{a_1, ..., a_4\}$ of such actions and that a BOT selects each of these with the same probability. With the help of log data it could be estimated empirically that human players select the alternatives with the following probabilities:

$$P(a_1) = 10\%, P(a_2) = 20\%, P(a_3) = 30\%, P(a_4) = 40\%.$$

Player p_1 was observed to have the following sequence of decisions:

$$O = [a_3, a_2, a_1, a_4, a_1, a_2, a_2, a_3, a_1]$$

In the following B is the event that player p_1 is a BOT and $\overline{B}$ is the event that player p_1 is a human player.

(a) Calculate the probability $P(O \mid B)$ that a BOT produces the given sequence.

(b) Calculate the probability $P(O \mid \overline{B})$ that a human player produces the given sequence.

(c) Assume that 1% of all players are BOTs. Calculate the probability $P(B \mid O)$ that player p_1 is a BOT.

Assignment 5-2 *Probabilistic Balancing*

Consider another game where players can choose between several different settings (e.g. races, classes, fractions) in the beginning. Let $s_1, ..., s_n$ denote such settings.

Assume that 1000 games between players with settings s_1 and players with settings s_2 have been recorded. 400 of those were won by the players having settings s_1.

Are the settings s_1 and s_2 well balanced? Assume a significance level of $\alpha = 0.05$ to confirm or reject the hypothesis. Calculate the probability of this observation assuming that the game is fair, i.e., that the chances for winning is equal for both players.