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Managing Massive Multiplayer Online Games

SS 2017

Exercise Sheet 5: Game Analytics

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Exercise 5-1 *Bot Detection with Bayes*

In the following regard an abstract game in which players regularly have to make decisions. Examples are:

- In which order to pick up objects
- In which direction the player should go at a crossroad inside of a labyrinth
- In which direction the player sends his exploring units

We assume that there are always four alternatives $\{a_1, ..., a_4\}$ and that a BOT selects each of these with the same probability. With the help of log data it could be estimated empirically that real players select the alternatives with the following probabilities:

	a_1	a_2	a_3	a_4
Probability	10%	20%	30%	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 real player.

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

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

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

Exercise 5-2 *Probabilistic Balancing*

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

Assume that 1000 games were monitored each between a player with settings s_1 and a player with settings s_2 (briefly s_1 vs s_2). 400 of those were won by the player with settings s_1. Is this game fair concerning the settings s_1 and s_2? Therefore calculate the possibility of this observation assuming that the game was fair, i.e. that the winning chances for both players were always 50%.