IKT710 - Project

# Introduction

# Task 1

Verify the gore game for Tsetlin and Lri schemes

# Task 2

Suggest how the players should play when the gore game is bi-modal, and the users know that it is bi-modal

## Intro

The problem of bi-modal goore games, is that if the game wants either 40 or 60% to choose yes, then if the model focuses on a statistical model. Then instead of getting 40 or 60%, a simple statistical model would likely get a probability of 50% to choose action 1. If there is a pattern to how the goore game wants the agents to choose the action percentage, then a more advanced LA should be able to predict when to go for the 40% accuracy and when to go for the 60% accuracy. If how ever the model only wants either 40% to say yes and 60% to say no, or 60% to say yes and 40% to say no, then there needs to be a prediction of how the others are voting, which mean that each of the agents predict how many of the other agents choose action 1 (call it yes) and how many does action 2 (no). Meaning that each agent predicts if they should do action 1 or action 2, solely based on how many agents they think will vote for each.

# Task 3

Suggest a simple scheme by which two learning automata can be compare in terms of accuracy and rates of convergence

## Intro

When comparing two learning automata’s there are two different methods of comparison, one is through mathematics, the other is through simulation. There are different benefits for each of them, as if you choose to make a mathematical model, then each model must have a certain pattern which allows for a single formula to calculate the accuracy, and another to calculate the rates of convergence. This is difficult as some models may be more difficult to calculate. This is where simulation has the benefit. Simulation is done simply, what must be done is that there must be created an environment, and an agent (the algorithm). These algorithms run until they converge (for the last x number of actions), or until the algorithm reaches a maximum number of iterations (actions). You then run the environment a large number of times, and check what the average convergence time is for all of these. Then you check what the average accuracy is, for all of the times the algorithm was ran.

# Task 4

Suggest at least one discretized and one estimator scheme to play the game

## Intro

One which goes more forward based on what the previous action caused, i.e. binary increase for reward, and incremental decrease for penalty. Meaning if the first action gave a reward, it goes towards the nearest edge by 1 step, if the next one is a reward at that point it goes towards it by 2, if the one after that is a reward it goes toward the edge by 4 and so on... while for penalty it goes towards the other action by 1 the first time it gets a penalty and increases this by 1 for each consecutive time it gets a penalty. This leads to an algorithm which has a reward which is more important than the penalty, by an increasing amount. (discretized)

Another would simply be the same type but using an estimator. Meaning that it decreases the probability of choosing an action by 0.9 the first time, then 0.9\*\*2, then 0.9\*\*4 and so on. This is given a reward for action a, which will lead to an increase of action a, while action b is that much less likely. For a penalty, this probability is 0.9, 0.9\*\*2, 0.9\*\*3 and so on. (estimator)

# Extra

Suggest a potential application of this problem.

If someone were to use battery powered sensor networks, and 50% of the sensors needed to give their sensor data at a time to give an accurate reading of the area. An example of this could be temperature readings, in which some of the locations might be extra cold or warm. So to get a good reading not only for that specific spot, but the general area in which the sensors were at; a goore game would be beneficial as there would be no need for communication between the nodes which would cause an increased power consumption. This is especially important if the sensors are solar powered and located in a country where there is not a lot of sun during the winter. As it would always be good to get an accurate reading from around the surrounding area, and the battery power should be conserved as much as possible so that one is always able to get this accurate reading during any time of the year.