Name: Matay Mayrany
Email: mayrany@kth.se

# Final Project - Distributed Artificial Intelligence and Intelligent Agents

# Introduction:

The objective of this project was to create a more complicated and intricate simulation of a festival and all the agents that take part of it, in comparison to the similar tasks we were assigned for homework. This report will explain how the project I created matches the requirement for the final project and all the different parts and agents that are necessary for it to do so.

Some of these requirements included having five different agents with differing qualities and at least three attributes that determine how they will interact with other agents and with their environment. The different types of agents will be more thoroughly explained in later sections however their names briefly explain their orientation and they are named “HipHopFan, PopFan, BoredGuest, SocialGuest, and BigSpender“.

The qualities that the agents have and which determine their behavior and interaction with other agents include “hypeLevel, outgoingness, and crowdBelonging”. Moreover each agent has a quality that is unique to them and largely influences their behavior, for example the bigSpender has very high generosity, the hiphop/pop fans have a favorite genre and the bored guest has a more rapidly decreasing hypeLevel. All these qualities will also be explained more thoroloughly in  a later section.

# Human Agents:

The total amount of human agents involved in this category is, as previously mentioned, a total of five. General qualities for all agents include their level of energy, denoted as hypeLevel, this goes down naturally with time, and goes up when they enjoy the music, drink or make new friends. The amount in which it increments or decrements is also dependant on the agent type for example the boredGuests have it decrement more severely and more often. Another quality that other agents have is their outgoingness and sociability. This determines how they interact with other agents and make friends. For example a Social Guest has high outgoiness so they use fipa to send friend requests to all Guests, but a bored guest might have a really low outgoingness value, and based on that they reject requests. Finally, another shared attribute is crowd belonging. This is determined by the music preferences of the agent and the amount of friends they have when they are at a stage. Based on a recurring time interval the agents hope between stages. This crowdBelonging value makes their stay at a stage longer or shorter.

Moreover, all of these agents are unique in their own ways and poses their own qualities, aside from the ones that they share with other agents but at varying degrees. These are the agents involved alongside a brief explanation about their attributes:

**HipHopFan:**
We will introduce in the section about the building agents, that the 4 stages in this festival tend to play a mix between pop and hip hop, some are purely one of the 2 genres. The hip hop fan as the name suggests enjoys hiphop music. Therefore based on the level of hip hop being played at a stage when they are their and the amount of other hip hop fans around the stage, their hypeLevel and crowding belonging varies.

**PopFan:**
Similar to the hiphop fan however more oriented towards pop music, pop stages, and other pop fans. They also tend to be less outgoing and drink less than hip hop fans.

**BigSpender:**
As the name suggests, this agent likes to spend their fictional money. Therefore, everytime their hypeLevel drops below a certain value, other guests would usually just go buy a drink at one of the bars, however the big spender chooses a . They are also responsible for getting the bored guests drunk by sending them friend requests and getting them in the circle of invitees for drinking.

**BoredGuest:**
This guest has an exceptionally low outgoingness level and an excessive hypeLevel drop compared to the other agents. This makes them less likely to make friends. They are also less likely to stay at a stage because their crowd belonging level is low. This can only be changed by social guests and big spenders sending them friend requests and offering them drinks. This will let them “break out of their shell” as each request increases their outgoingness and in turn increases the likelihood of them accepting future friends requests and drink offers, even if they turned down the current ones.

**Social Guest:**
The opposite of bored guests, exceptionally outgoing and hyper. They send all agents friends requests until the max tries is reached. They usually end up driving the revenue up if they befriend big spenders and help bored guests participate and also befriend big spenders.

# Building Agents:

Another requirement for the assignment was to have 2 places at which the agents can meet. The following 2 building were chosen from previous assignments.

**Stage Agent:**

As in the assignment with the stages and the agents choosing them based on utility with timely changing values. This concept is kept alive, however the amount of time it takes before the agent requests the stages utility values depends on the agents crowd belonging when they are at that stage. For example if a hip-hop fan is at a hip hop stage, their crowd belonging increases. They also send fipa messages to all other hiphopers that might be at the stage, and for every message they get back of someone confirming that they are, their crowd belonging increases by an interval and they also add those friends to their friend list if they are not already there. All this makes them less likely to leave the stage to another, or at least not as quickly.

Moreover, the kind of music playing and the crowd belonging affects the agents hype level, which in turn can affect their actions. For example if an agent likes their music their hype level increases and they are less likely to leave the stage to drink. If they don't, the opposite happens.

**Bar Agent:**

This is the location that all agents resort to when their hype levels are getting too low. They simply go to the bar, if they are big spenders and have friends with low enough hype levels they invite them for a drink. Otherwise, they simply go to the bar to buy a drink or a few until their hype level is above the specified threshold. The price of every drink that is bought is added to a metric that is being recorded for the project called “totalMoneySpentInBars”.

# Recorded Metrics and Conclusions:

Another requirement for the project was to record at least 1 metric that will then be used to draw interesting conclusions from those metrics. The metrics I choose to record were 2, and they are the following:

**Total money spent in bars:**

I wanted to record this to see the effect of having homogenous agents, where one kind dominates the quantity of agents and how it might affect the overall money spent in this model. What I found was that when 1 kind of agents are dominating, if they are big spenders this will of course leed to a steeper curve when tracking this metric. Moreover, I wanted to see the effect when we have mostly social or bored guests and mostly music fans that might get enough joy out of the music and not need to buy drinks. Social fans seemed to have a positive affect, mainly cause they help bored guests and befriend big spenders. Having mostly music fans in the mix led to more money spending even in comparison to having big spenders, as their hype levels are more susceptible to dropping when listening to music they don't like, leading them to the bars. See figures and graphs in the next section. An interesting thing to look at next would be seeing the effect of having homogenous genres being played at all stages (an all hip hop festival for example) on this metric.

**Total number of friendships created:**

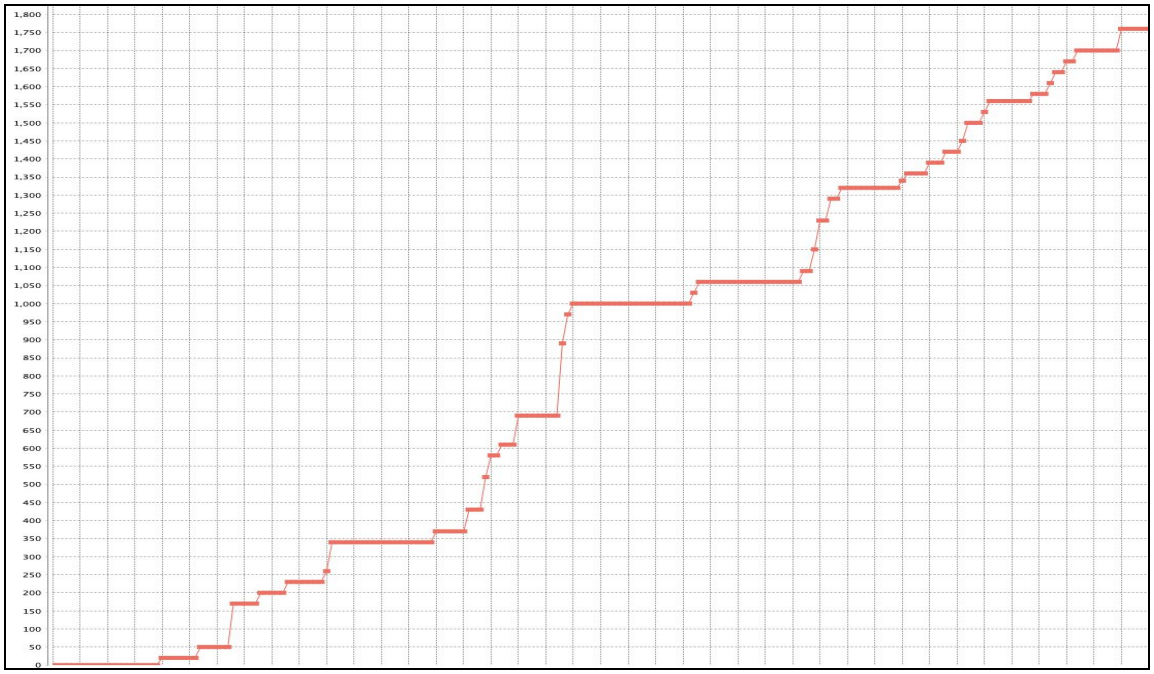
This metric is recorded basically for the same reasons as previously, which is to see how different distributions between the quantities of agents and their kinds affect the total number of friendships that these agents end up creating and on the rate at which this happens. Everytime a pair of agents add each other to their friends list this metric increases by 1.

This metric seemed to be positively correlated to increasing the homogeneity of the environment to all music fans compared to having it evenly distributed between agents.

# Graphs:

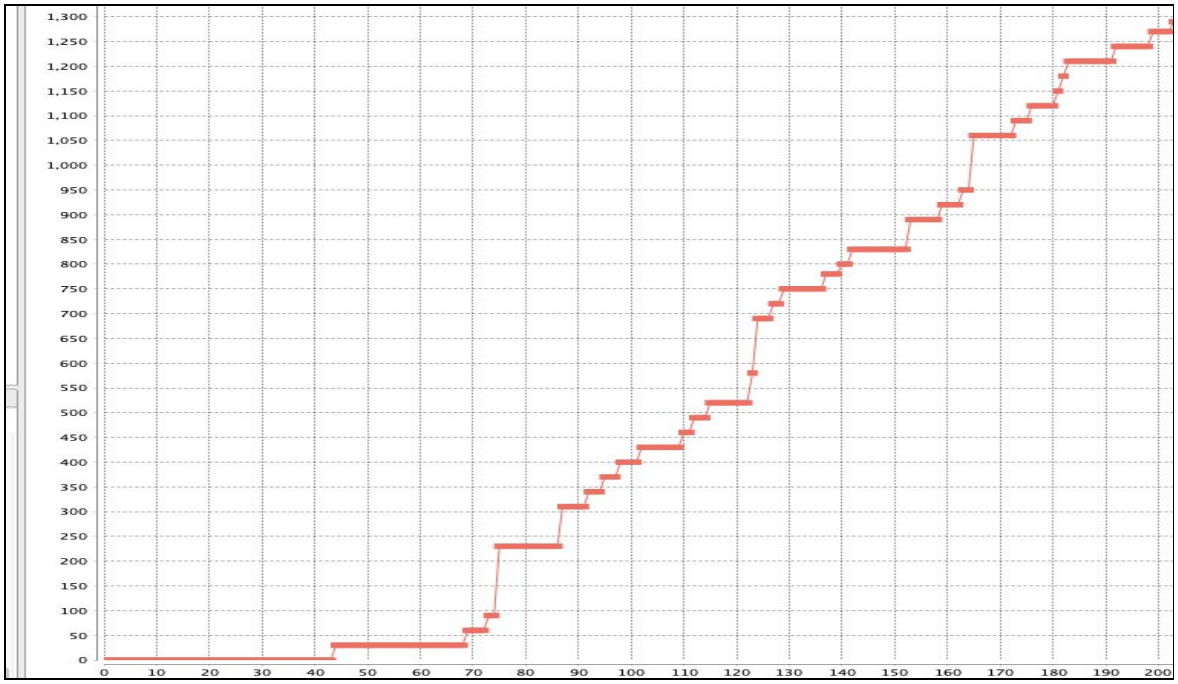
**Total Money Spent in Bars:**

*Mostly Big Spender - Total Money spent over 200 cycles:*



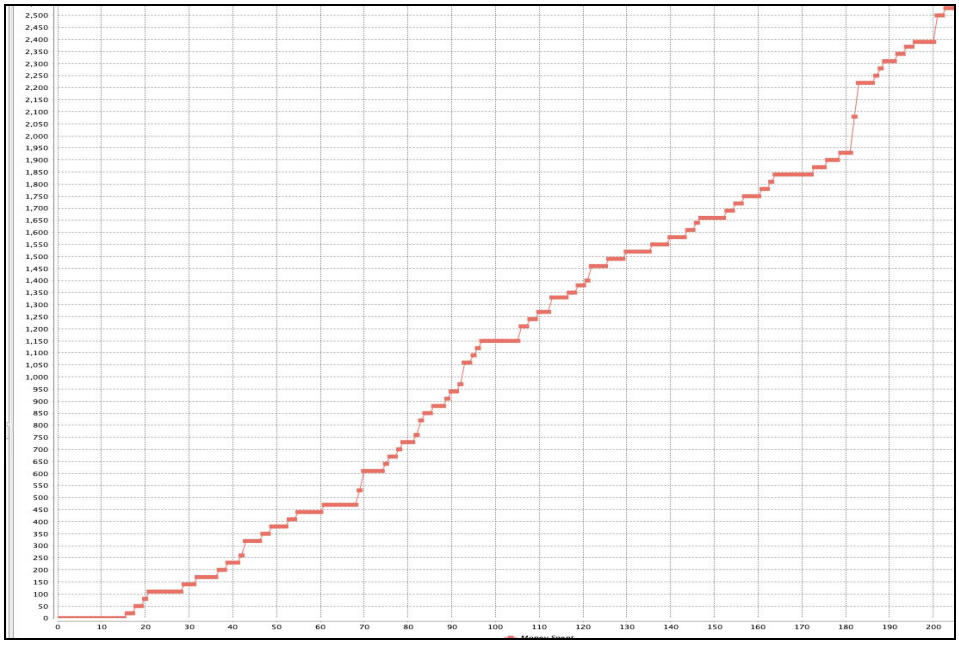

*About 3800 in 200 cycles*

*Mostly Bored Guests - Total Money spent over 200 cycles:*



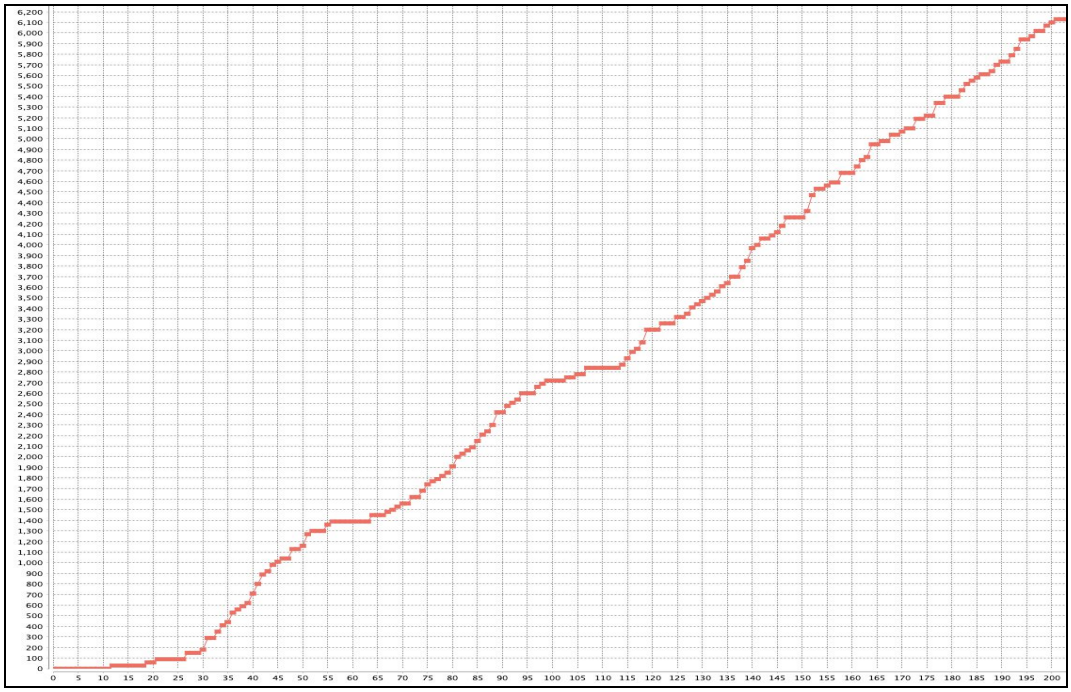
*About 1300 for 200 cycles*

*Evenly Distributed between the 5 agent kinds - Total money spent over 200 cycles:*



*About 2400 for 200 cycles*

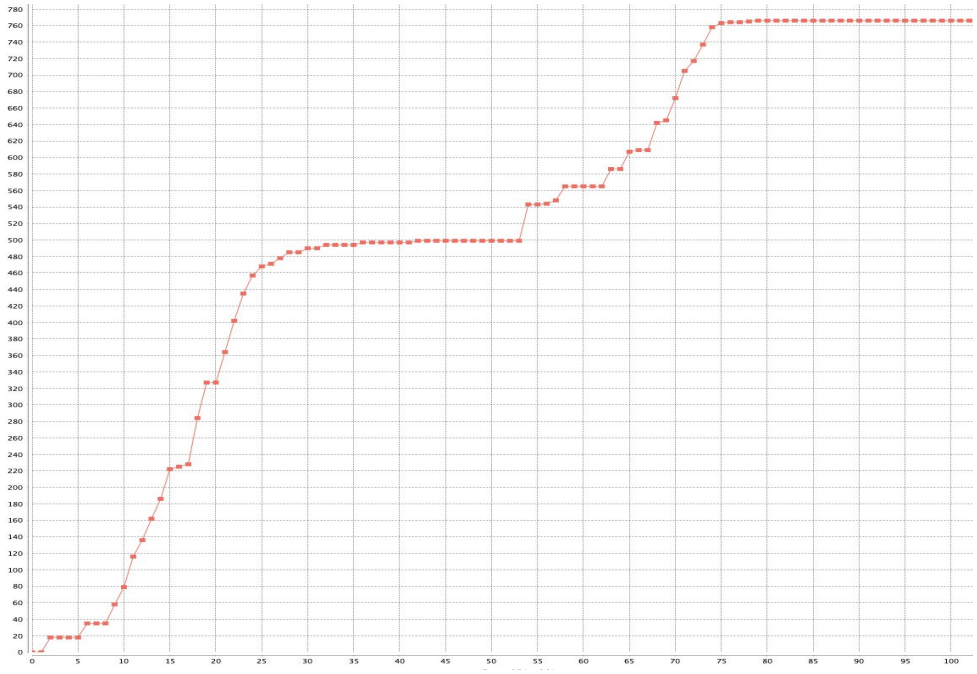
Mostly music fans (hip-hop/pop) - Total money spent over 200 cycles:



*About 6400 for 200 cycles*

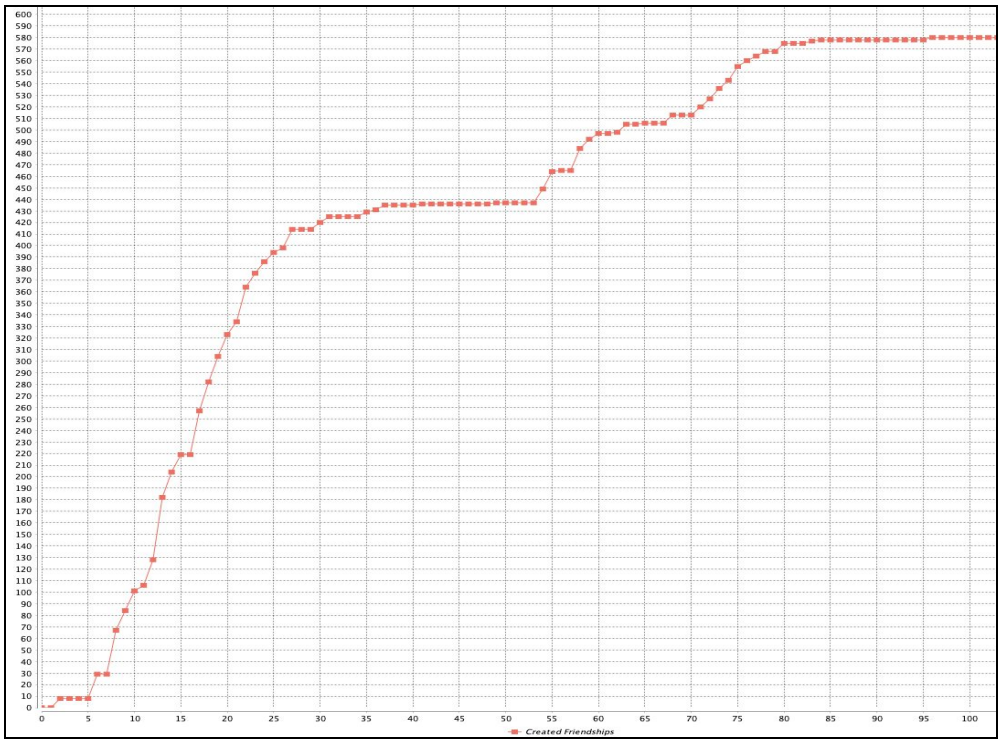
**Total number of friendships:**

*Mostly music fans - 100 cycles:*



*About 770 friendships for 100 cycles*

*Even environment - 100 cycles:*




*About 580 friendships for 100 cycles*