**Boids Simulation**

An artificial intelligence is a computer system that can perform tasks that normally require human intelligence, such as visual perception, speech recognition ,decision- making, and translation between languages.Boids is an artificial intelligence algorithm, developed by Craig Reynolds in 1986, which simulates the flocking behaviour of birds. Flocking behavior is a behavior that uses steering behavior or pathfinding to make a group of agents move by using the summation of their velocity vectors applied to their position.

Agent decision making is depend on this 3 rules: cohesion, alignment, and separation. Cohesion is where the agent tries to find the centre of mass of other agents within a specified radius or neighborhood, then move toward that, so centre of mass is the average of all the agents distance from the current agent.Alignment is where the agent try to match their own speed and direction with the other agents near by them. Separation is where the agent tries to maintain a certain distance away from the flock.

Cohesion: First, go through all the agents, then add all the agents displacement vector from the current agent. Second, divide that total of positions by number of agents minus 1. Then to move the agent that currently checking on by 1% to the new position, get the total of positions minus position of the agent currently check on then divide that by 100.

Alignment: to match the velocity with other agents, the calculation is pretty much the same as cohesion, go through all the agents, then add all the agents velocity vectors except the one that is currently checking on. Then divide that total velocity by number of agents minus 1. After use that total velocity again minus the velocity of the agent that currently check on then divide that by a number. For example if divide by 8 then the currently agent that check on its velocity got added to about an 8.

Separation: to separate the agent from others, also loop through all the agents, then compare the distance between all the agents to the agent that currently check on to a number. If the distance less than the number which mean the current agent need to move away, so to do that get each and every agents position one at a time and subtract the position of the agent currently check on then use zero and subtract from it. After the calculated the result is how far the current agent that is check on need to go away from the agent that use to compare with.