ALGORITHM OF ARTIFICAL INTELLIGENCE

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Introduction

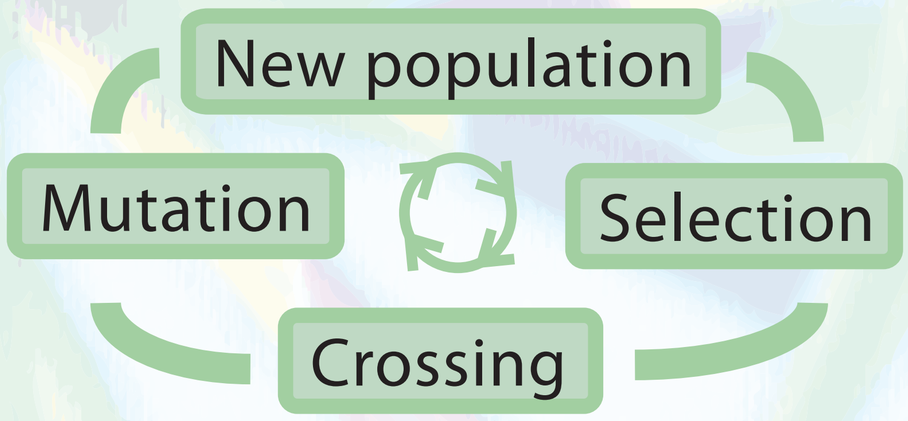
Objective of our group was creation of computer game, where players will be operating by automatic developed behaviour. So that computers operating players will find the optimal way of behaviour alone. For this we will use linear genetic programming.

Linear genetic programming

Princip of genetic alhorithm is the simillar to Natural Selection Theory formulated by Darwin.

On the start we create some individuals. Everyone has in genome characteristics. In linear genetic programming genome contain instruction, which are evaluate by our program.

Genetic algorithm have three stages: Selection, Crossing and Mutation.



In Selection stage we choose the best individuals, in Crossing stage we crossing their genoms and in Mutation stage we randomly change some characteristic or instruction in genome.

After this stages, we have new population with new individuals. This process is still runing, until we stopped them. In time we have still better and better individuals.

Implementation

We implemented game in programming language called C++. It's 2D map composed from connected convex polygons which enclose an area in which can players move themself. Game is real-time, that means it consist of very fast time sequences.

There are 2 teams of players fighting against each other. They can shoot and their objective is to kill as many enemy players as possible. Players will spawn at their position at the beginning and they fight until end of the round. Afterwards follows fitness evalution for each player and genetic algorithms step.

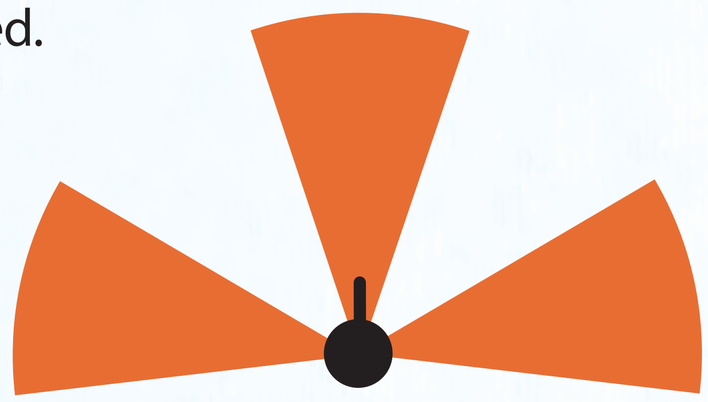
Every player can move himself and shoot. Also has a genom which contains linear list of instructions. These instructions are treated by simulated processor and players behavior is in accordance with the result.

Players have also three senses, all are sights. Their area of effect is marked in the bottom picture. Each of them outputs two informations, what player see and how far is it.

Their fitness function depends on folowing parameters: enemy killed count, lenght of trajectory, distance from spawn and lifetime.

Crossing is done by the tournament system, that consist in selection of some number of players and best two of them are crossed. Mutation and new population forows.

This will repeat until we want to end the game.



Conclusion

In our work we implemented to game engine genetic algorithm, which edit behaviour of players, which are operated by computer. Game engine provides sight. Players can recognize wall or players.

On the start of game all players stay on one place, or going to circle. But after 20 minutes (40th generation) players find enemy and shooted him. After 30 minutes (60th generation) on the end of turn there rest only four to eight players alive.

It shows, that genetic algorithm really works.