

# Comparative Analysis of AI Models for Team with Goal of Survival

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## **Problem Statement**

Teams can be divided into two types: team with a leader and team without a leader but each member cooperates with each other. Putting this into games, which team behaves better and looks intelligent? For this purpose, we would like to evaluate different methods for AI teams, in an environment where the goal of the team is survival. More specifically, we would like to compare centralized approaches (i.e. team with leader) with decentralized approaches (i.e. team without leader but group members cooperate with each other).

## **Techniques Involved**

For decentralized methods, each teammate AI makes their own decision. And there are many levels of communication among team members: level-1: self-interested; level-2: sharing useful information; level-3: sharing status and strategies accordingly. With each level, more information is shared. For centralized methods, there is a leader in the team who obtain all the information and give command to others.

Our thought is using decision tree, state machines and maybe some machine learning techniques. And of course, there is some basic AI techniques like path-finding, decision of fight or flight and so on.

## **Evaluation Methods**

One evaluation metric is the time of survival of the team. By finding by which methods can a team survive the environment to the last. Another thought is to arrange two AI teams using different methods against each other. The winner is better.

We could also use the survival rate (survival times/times of encountering enemies) and winning rate (times of beating enemies/times of fighting with enemies) of AI. Both reflects the success of decision making, and the second one specifically presents how smart the AI fighting skills are.

## **Importance**

In most games, difficulties are achieved by making enemy stronger. We are interested in making it difficult by making AI more intelligent and characteristic. In decentralized methods, from self-interested to sharing team status, each agent chooses the action based on the information they owned. And in centralized methods, the leader gathers all the information and give the order to each agent. Both methods can be used in many games where team cooperation and strategy are needed. Besides, by evaluating the performance of different methods, we can find out which method is better under some environments or situations, and what the advantages and disadvantages of the method respectively are.