**PredatorPrey**

**Overview**

PredatorPrey is a program that simulates the life of wolves and sheep in which the wolves try to capture the sheep for food and the sheep try to escape from being eaten. Since the sheep want to stay alive and consume any food in the field, they need to avoid the wolves while moving towards the food and stay away from other sheep while moving in groups. The wolves follow a similar set of rules in the field. They try to approach the sheep while staying as a group but not colliding other wolves. After a certain number of moves, a new generation of sheep and wolves is produced with better intelligence comparing to the previous generation. This program incorporates various artificial intelligence topics such as artificial life, neural networks, and supervised learning.

**Background**

[artificial life]

[neural networks]

[vision]

Supervised learning is a machine learning technique that trains the input data according to the already existing data. Since it is expensive and time consuming to train the input data manually, supervised learning, along with many other techniques can be applied in the artificial intelligence field of study and work to efficiently achieve the goals with automation. Supervised learning is a very useful technique for classifications of unknown objects. For example, with some labeled pictures, the pictures that have not been labeled yet can then be compared with the labeled pictures and then determine if they are similar. Face recognition is another example in which the knowledge base has a set of “faces” that can be compared with the input data. The quality of the knowledge base is very important to successfully classify the unknown data because the classification is highly dependent on the labeled data.

**Project**

[Artificial Life]

[Neural Network]

[Vision]

At the end of every generation of wolves and sheep, a new generation needs to be generated with better intelligence comparing to the previous generation. In order to make sure the new generation meets the standard of intelligence required, which is that only the “good” wolves and sheep can be kept from the previous generation. Supervised learning played an important role while evaluating the newly generated wolves and sheep. It takes the previous generation of wolves and sheep with labels of “good” or “bad” and evaluates the newly generated wolves and sheep against the closest wolf or sheep using k-nearest neighbor algorithm. The newly generated wolves and sheep will then be labeled as “good” or “bad” according to the k-nearest neighbor. Only the wolves and sheep labeled as “good” are to be kept in the new generation. With supervised learning incorporated in the generation of wolves and sheep, every generation will take only the “good” wolves and sheep from the previous generation and therefore improves performance of both the wolves and sheep over time.

**Process**

Research

Implementation

Testing

**Result**

**Conclusion**

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