Report for the Assignment #4(LCS)

1. Dataset Information

In this assignment, the same dataset which was previously used in Assignment 1-3 is still being used in this assignment since the output comes from four different algorithms needed to be compared. This dataset contains 34 attributes, and 1 target value need to be classified. And the dataset is trying to explore how there are free electrons in the ionosphere are related with these attribute values. And the target value in this dataset are string values, like 'b' represents bad, and 'g' represents good.

2. LCS Algorithm

Learning classifier system is known as rule-based machine learning method and is also a combined system that combine a discovery component, like the genetic algorithm, and a learning component, like supervised learning, reinforcement learning and etc.

There are several key steps and parts in the LCS algorithm, and the details are as below:

- Environment: the environment is the source of the data that the LCS is going to learn from, it can be offline or online. Here in this assignment, it is the dataset mentioned in the first part, and I separated the shuffled dataset into a 4:1 part and use 4 to train and use 1 to test.
- Rule/Population: the rule in the LCS algorithm is like a relationship between the attributes values and the final prediction, which can be though as if state then predict, and the rule is typically represented as #1000#####1->1, here, 1 means the feature needs to equal to be 1, 0 means needs to be 0, # means either value for that attribute is fine. In this assignment, the 34 attributes are also represented in this way, but 0 here