Report of Project 1

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Major: Intelligent Manufacturing

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1 Introduction

League of Legends (abbreviated LoL) is a multiplayer online battle arena video game. In League of Legends, players assume the role of a "champion" with unique abilities, varying around their class, and battle against a team of other player- or computer-controlled champions. In the main game mode, Summoner's Rift, the goal is to destroy the opposing team's Nexus, a structure that lies at the heart of their base, protected by defensive structures.

In this project, I have about 3 Million race records. Each record comprises of all publicly available game statistics of a match played by some gamer, including an important field called "winner". If "winner" is “1”, the team 1 won the match, or vice versa.

Through training the training set by different ways, I will find out the appropriate method to predict the result of the game. When I train the data, I enter all the fields in the match record for each game (except “winner) and mark the record as "1" or "2".

The test set comprises of about 2 Million of such records. In order to check the reliability of the results obtained from the training set, the results are applied to the test set for inspection. If the test results show an accuracy rate of 50% or more, then the method is desirable.

2 Algorithms.

2.1 Decision Tree

2.1.1 Algorithm Introduction

A decision tree is a graphical depiction of a decision and every potential outcome or result of making that decision. It is a decision analysis method to calculate the probability that the expected value of net present value is greater than or equal to zero, evaluate project risks, and judge its feasibility based on the known probability of occurrence of various situations. It is a graphical method to intuitively apply probability analysis. Individuals deploy decision trees in a variety of situations, from something simple and personal to more complex industrial, scientific or microeconomic undertakings.

2.1.2 Parameters

① Set the maximum depth of the decision tree to none, indicating that the decision tree has no depth constraints.

② Set the minimum number of samples of nodes to 2.

③ Set the minimum sample number of leaf nodes to 1. If the number of leaf nodes is less than the number of samples, branches will be pruned together with the sibling nodes.

④ The minimum sum of all sample weights of the leaf node is 0.If it is less than this value, it will be pruned together with the sibling nodes, that is, the weight problem here will not be considered.

Figure 1. Visualizing Decision Trees(The enlarged image is in diabetes.png)

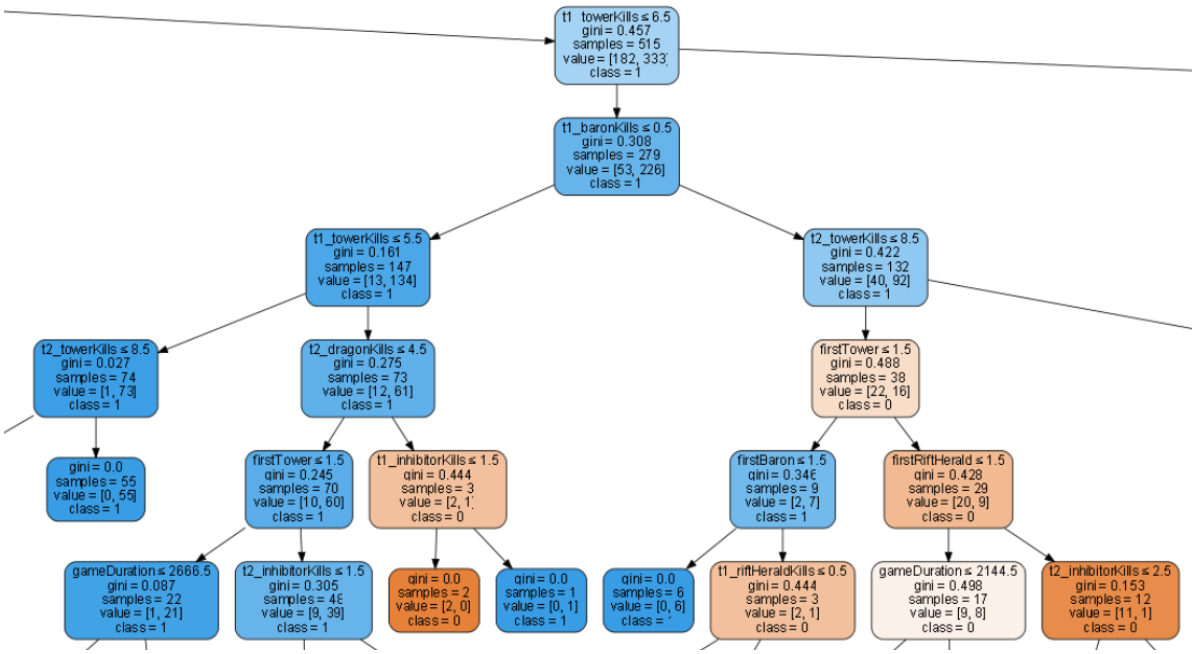

Figure 2. Part of the diabetes.png

2.2 ANN

2.2.1 Algorithm Introduction

An artificial neural network (ANN) is the piece of a computing system designed to simulate the way the human brain analyzes and processes information. It is the foundation of artificial intelligence (AI) and solves problems that would prove impossible or difficult by human or statistical standards. ANNs have self-learning capabilities that enable them to produce better results as more data becomes available.

2.2.2 Parameters

① The sample number of each batch is 50.

② Set the learning speed as 0.01.

③ There are 16 Settings for input.

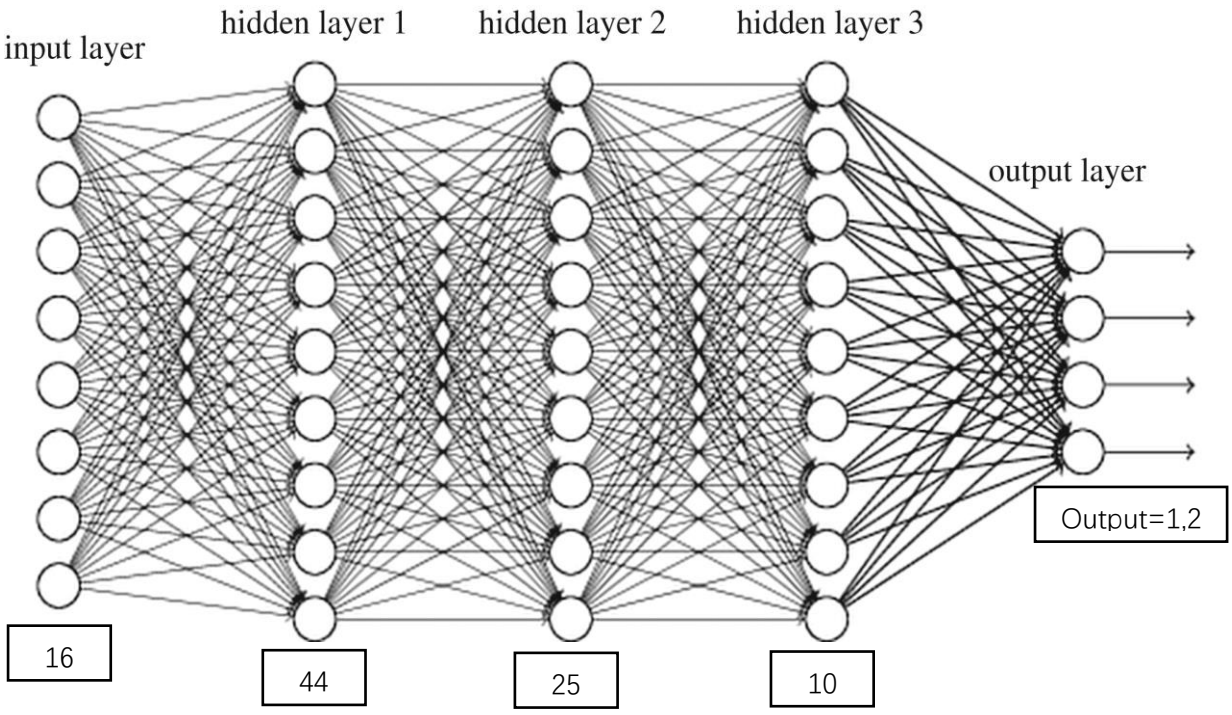

Figure 3. ANN algorithm schematic

3 Requirements

Decision Tree	ANN
sklearn	sklearn
pandas	pandas
six	torch
IPython	numpy
pydotplus	
os	

Table 1. The prerequisite packages I should use for my code

4 Results

Times	Decision Tree	ANN
1	0.9613815214223258	0.49426794909161564
2	0.9611386379092587	0.48202662003303215
3	0.9614300981249393	0.4939764888759351
4	0.9617701350432333	0.49859127562421063
5	0.961284368017099	0.4765860293403284
Mean Value	0.961400952	0.489089673

Table 2. The results of the five calculations and the mean value of the results

```
Accuracy: 0.9613815214223258
dot: graph is too large for cairo-renderer bitmaps. Scaling by 0.618654 to fit

dot: graph is too large for cairo-renderer bitmaps. Scaling by 0.618654 to fit


Process finished with exit code 0
```

Figure 4. The result of Decision Tree calculation

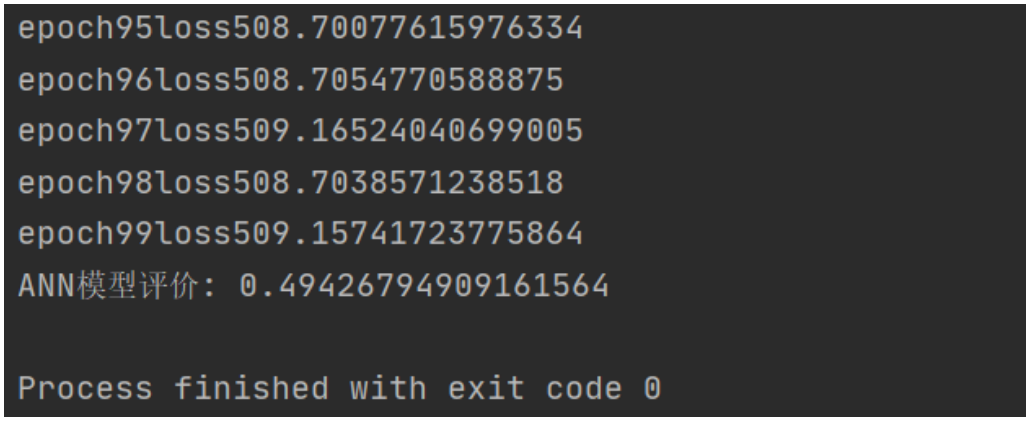

Figure 5. The result of ANN calculation

5 Comparison and discussion

	Decision Tree	ANN
Result	0. 961400952	0.489089673
Run Time	Short	Long
Accuracy greater than 50%	Yes	No

Table 3.Decision Tree vs ANN

By calculation, the accuracy of Ann is less than 50%. According to the requirements of the project, this method is not suitable for the calculation of this project.

By comparison, the running time of decision tree is shorter and the running result is more accurate. This method has a better performance in this project.

Because the visual decision diagram is too large, the program reduces the accuracy of the picture before output.

Other Documents List

1. Decision Tree.py
2. ANN.py
3. diabetes.png