**Page 1**

The problem of link-sign prediction is usually divided into the link-prediction problem and the sign-prediction problem. The link-predictor aims to predict the existence of the link in the future, given the non-existence of this link at present. The sign-predictor aims to predict the sign of a link in the future, given that the existence of the link is confirmed.

In other words, the sign prediction problem tries to predict the attribute of the link, here positive or negative sign, given the existence of the link in the future. One of the classic example is “friends of friends are friends” and “friends of enemies are enemies” for prediction.

**Page 2**

In this project, we limit to the problem of link-sign prediction, for example we consider only two possible attributes of a link which are positive or negative. The approach that we use is finding each of node’s properties as the import training data of machine learning to predict the sign of the link.

**Page 3**

We define a collection of features for our initial machine-learning approach to this problem. Firstly, we find each of node’s degree with sign feature.

**Page 4**

Then, remove directly connect each pair of nodes edge and find the shortest path for all pair of nodes in the graph. Not hard to understand, the longer the shortest-path node pair, the less influential it is to predict the sign which edge the two nodes are directly connected to.

**Page 5**

Finally, get the clustering coefficient and the centrality of the nodes which representing the degree nodes tend to cluster together and a ranking to identify the most important nodes in the graph. Import all of the features data into machine learning model training.

**Page 6**

Let’s show you the coding detail.