An Analysis of Xi Feng Parties in the Northern Song Dynasty through Complex Network Algorithms

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Abstract. In this paper, we mainly use several methods of machine learning. These methods were previously used on social networks to model and analyze the social relations, between Xifeng Parties in the Northern Song Dynasty. To our best knowledge, no one has ever made a combination of big data analysis, social network theory and the history of factional conflict in the Northern Song Dynasty. The attempt we made is an innovation of involving the intersection of natural sciences, social sciences and the humanities. We use BFS on CBDB with constraints to establish a network of people, which can be regarded as a weighted directed multi-graph. We simplify the graph into a weighted digraph and use pagerank algorithm to obtain the influence table, the political influence table and the positive political influence table by using different weighting methods. By analyzing the data obtained from the algorithm, we confirm several conclusions about the new and old parties in the study of Song history.

Introduction

Factional conflict plays an important role in studying historical development. First of all, by analyzing the nature and representative figures of the parties, we can basically understand the composition and differentiation of the ruling class of the dynasty. Secondly, by analyzing the importance of the party, we can understand the historical trend afterwards. The victory of a certain party may have an important impact on the reign of the ruling party or the subsequent dynasty. Thirdly, the factional conflict or the internal friction of the country had made the next dynasty pay special attention to factional conflict. For example, in the Song Dynasty, the Niu-Li Conflict that led to the internal consumption of the Tang Dynasty were vigilant. Therefore, Song people remain "a group of harmony", but also because of the reconciliation and balance among different factions under the harmony, led to a deeper factional conflict in the Mid-Late period. In general, party disputes may be concentrated within the literati group, or may be composed of Empresses’ maiden families, eunuchs, and scholar-officials, and are not limited to one party. But factional conflict is a political struggle within the ruling class and does not involve civilians. Therefore, studying factional conflict has an important role in studying the characteristics of the dynasty and the literati group.

In the Northern Song Dynasty Xifeng Factional Conflict, the social network of the sergeants were complicated. In the early years of the Northern Song Dynasty, Song Taizu took a series of measures to strengthen the centralization of power, which led to political and social crises in the Mid-Late period. In order to solve these problems, the ruling group has had several reforms such as the “Qingli New Deal” and the Wang Anshi Reformation. In the past, historical research has analyzed the nature of the party on the basis of historical data, rather than studying people as independent subjects. If the research is focused on famous people, Deng Guangming and others have already done very well, whose claims have been summarized in more detail ways[4]. But these studies often do not pay attention to the relationship among smaller characters. It can be said that this is an inherent limitation of manual analysis. Due to manpower limitations, it is difficult to pay attention to some minor figures and special non-political and indirect relationships. At the same time, due to the subjectivity of
historical researchers, the evaluation of different parties and their characters often selectively extracts historical data to verify existing views. In the past, historical studies have in-depth analysis of a certain party, or derived a viewpoint with personal characteristics. According to different historical materials, the results are different, but the study on the interaction of the parties is not enough, especially in the environment of the entire scholar-bureaucrat group while concerning the party. The advantage of the algorithm is that it can automatically process large-scale data, and the data itself is not subjectively influenced by the researchers.

The Chinese Historical Biography Database (CBDB)[12] is an online relational database with the goal of systematically collecting important biographical data in Chinese history. Its sources of information in the Song Dynasty include the index of the biography of the Song Dynasty, the biography of the official history, the epitaph, the biography of the local chronicles, and the chronology of the county. It provides powerful data support for the study of Song history.

The interpersonal relationship in the factional conflict can be seen as a complex network $G = (V, E)$ or multiple directed graphs. Each node $V$ represents a character, and each edge $E$ represents a relationship between them. In this view, many of the properties of the network can correspond to many important issues in history. In CBDB, in addition to the basic name, birth and death, and other information, there are also a number of relatives and social relationships extracted from historical materials, which just support us to establish the network for subsequent data analysis. Therefore, based on this database, we introduce algorithms in complex networks to analyze data.

Link analysis algorithms are often used to rank the importance of nodes, and it can be seen as an assessment of the influence of characters when corresponding to history. In this paper, we use a variety of methods to make a choice between interpersonal relationships, and get few kinds of different rankings such as influence, political influence, and positive political influence, reflecting the breadth, depth, and positiveness of the influence of characters. Based on the rankings, we conducted some analysis of the results, which confirmed a number of historical views.

In this article, we mainly consider the first old and new factional conflicts in Xifeng years. We use these algorithms for historical analysis and also verify the rationality of the algorithm. Previously, no one has combined the complex network algorithm with the history of the Northern Song Dynasty party disputes. Our attempts have involved the intersection of natural sciences, social sciences, and humanities. It is a multidisciplinary innovation attempt.

Algorithm

Breadth-first Search

Breadth-first search[2], also known as the BFS algorithm, is an algorithm for traversing or searching a tree or graph. He starts from any node of the graph (this point is called a search key), first explores all the neighboring nodes of the node, and then moves to the next-level neighboring node to search. All reachable vertices of the search key can be obtained after the algorithm has been iterated. Specifically, in this paper, we choose Wang Anshi as the search keyword to start the search, and check all the characters related to the relationship between the Kinship and the Social Association one by one, when iterating to a certain round of search queue is empty, Then the algorithm ends and we get the character relationship network we need.

It is necessary to explain here why the breadth-first search for the searched map can be considered as the network of all participants during the old and new party disputes, or in other words. Why is the breadth-first search guaranteed that all characters in the event are searched? In short, the algorithm takes into account all of its associated characters when processing each character, and screens whether the character meets our screening criteria one by one. After the iteration, the map we got contains all indirect links with Wang Anshi, and the line characters in the contact also meet our screening criteria. In theory, we may indeed miss individual characters. For example, if someone’s teacher’s index year is before 1048, and the student’s student happens to be after 1110, and the teacher’s student is involved in the Qingli New Deal or the second old and new factional conflict, the algorithm It is indeed possible to miss the person and the indirect link between his teacher and the
student. However, we believe that if a person has not had any relatives or social relations with anyone in the index year 1048-1110, the person can basically think that there is no dispute with the old and new parties, and the indirect connection brought about by it can be considered relatively important.

In the actual experiment, there is only one new node in the third iteration, and the algorithm ends after the fourth iteration. Explain that the scholars who have any connection with the old and new parties are all related to Wang Anshi within the three-tier relationship. However, the maps searched by this algorithm are not different depending on the search keywords. It is only convenient to select Wang Anshi. If you change to Sima Guang or Ouyang Xiu or any major person, the search results are the same.

In the end we get multiple directed graphs based on relational networks.

**Page Rank**

The Page Ranking algorithm[3] is a link analysis algorithm that assigns a digital weight to all nodes in the network in order to measure its relative importance within the set. The algorithm can be applied to all sets of entities with mutual reference relationships, and the weight assigned to any given element $E$ is called the pagerank of $E$. We use this algorithm to estimate the influence of each person in the social network of the characters. By constructing the edges regularly, the influence of the characters at different angles can be estimated.

Expressed in mathematical language, at $t = 0$, we initialize a distribution probability for each node, and then for each iteration, we update the distribution probability of each point until the algorithm converges.

\[
PR(p, 0) = \frac{1}{N}
\]

\[
PR(p, t + 1) = \frac{1-d}{N} + d \sum_{p_i \in \text{in}(p)} \frac{PR(p, t)}{L(p)}
\]

Here we adjust the weights of each side and use the pagerank algorithm to calculate the three relationship rankings of the person relationship influence table, the political influence table and the positive political influence table.

For the character relationship influence table, we simplified the multi-directional graph to a directed graph with a weight of 1. The graph can represent the network of relationships. Only the relationship between the characters has been considered here. The pagerank value can represent the extent of the influence of the relationship.

For the political influence table, we reduce the multi-directed graph to a directed graph whose weight is the number of edges in the multi-graph. For example, if A in the original multi-directed graph points to B with three edges, the edge of A in the directed graph that points to B has a weight of 3. Considering the number of relationships between characters, the calculated pagerank can represent the total political influence of the character.

For the positive political influence table, we manually label all the relationships and classify them as positive, negative and non-prone. For example, "recommendation" is considered to be a positive relationship, while "imposed" is considered to be a reverse relationship, and the relationship of "unknown" and other non-expression tendencies is a non-prone relationship. We only retain the edge of the positive relationship, and then calculate the pagerank value, we can get a positive political influence table, reflecting the degree of support it receives.

**Experimental Results**

We first show the influence estimates obtained by the Page algorithm under different edge retention conditions. Due to space limitations, only the top 15 of each ranking is shown.
Table 1. The influence rankings of characters.

<table>
<thead>
<tr>
<th>Character Relationship Influence</th>
<th>Political Influence</th>
<th>Positive Political Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>PR</td>
<td>Name</td>
</tr>
<tr>
<td>Wang Anshi</td>
<td>0.047085</td>
<td>Wang Anshi</td>
</tr>
<tr>
<td>Ouyang Xiu</td>
<td>0.030292</td>
<td>Ouyang Xiu</td>
</tr>
<tr>
<td>Su Shi</td>
<td>0.026759</td>
<td>Su Shi</td>
</tr>
<tr>
<td>Sima Guang</td>
<td>0.020997</td>
<td>Sima Guang</td>
</tr>
<tr>
<td>Wang Gui</td>
<td>0.012323</td>
<td>Huang Tingjian</td>
</tr>
<tr>
<td>Cai Jing</td>
<td>0.011519</td>
<td>Cai Jing</td>
</tr>
<tr>
<td>Huang Tingjian</td>
<td>0.011334</td>
<td>Su Zhe</td>
</tr>
<tr>
<td>Su Zhe</td>
<td>0.010819</td>
<td>Zhang Fangping</td>
</tr>
<tr>
<td>Zhang Fangping</td>
<td>0.009769</td>
<td>Wang Gui</td>
</tr>
<tr>
<td>Zhang Dun</td>
<td>0.009721</td>
<td>Zeng Gong</td>
</tr>
<tr>
<td>Zheng Xie</td>
<td>0.009116</td>
<td>Fan Zhongyan</td>
</tr>
<tr>
<td>Zeng Gong</td>
<td>0.008319</td>
<td>Fan Chunren</td>
</tr>
<tr>
<td>Lv Tao</td>
<td>0.008307</td>
<td>Lv Tao</td>
</tr>
<tr>
<td>Fan Zuyu</td>
<td>0.008102</td>
<td>Zhang Dun</td>
</tr>
<tr>
<td>Fan Chunren</td>
<td>0.008097</td>
<td>Zheng Xie</td>
</tr>
</tbody>
</table>

**Summary**

We mainly focus on Wang Anshi and Sima Guang as the Xifeng factional conflicts represented by the two factions, but the subsequent factional conflict is also used as a reference for political influence.

First, the top four influences of interpersonal influence, political influence, and positive political influence have been consistent. They are Wang Anshi, Ouyang Xiu, Su Shi and Sima Guang. This shows that they are both very powerful and positive in terms of not only from the interpersonal point of view but also from a political point of view. Secondly, on the issue of the identification of the new and the old parties, we can also see that the results of the KL-FC initialization are basically in line with expectations. The specific analysis will be carried out below.

**Wang Anshi and His Party Representatives**

According to historical facts, Wang Anshi began his career in the second year of the Qing Dynasty (1042). The traditional view is that the failure of the reform comes from the power of the opposition forces and the partial improvement of the feudal landlord class rule, rather than the resolution of the fundamental land merger issue and the people's support. Both factions rely on power to carry out the upper-level interaction. In fact, in the study, we found that Wang Anshi ranked first in all aspects of interpersonal relations, politics, and positive political relations. Through the comparison of the old and new parties and influence, the top five influencers except the Wang Anshi are old parties or those who favor the old party. According to the time period we took, the old party only appeared for nine years, and the new party has always been at the center of power. It is not difficult to verify the "activity" of Wang Anshi.

In addition, when comparing the influence table with the old and new party tables, we found that the representative figures of the new party, such as Zhang Wei and Lu Huiqing, have a strong influence on the influence of interpersonal relationships and have declined in the rankings after eliminating the negative relationship. The traditional research of the new party has always been more organized, followed by political means. This kind of organization is the textual interpretation of the influence of interpersonal relationships. But the history of these individuals is not very high. Wang Anshi’s failure to use people is also a more recognized fact, in line with our expectations for the evaluation of the New Party.
Because Cai Jing was characterized as a traitor, later generations often tried to clarify their relationship with him. When later generations wrote history, they didn’t mention his name and events. However, in the political influence table, we found that Cai Jing ranked very high. After data analysis, we found that most of the relationships are for Cai Jing’s impeachment, which are negative. We believe that these impeachments are mainly used to clarify their relationship with Cai Jing. Among the interpersonal influence and political influence, he ranked sixth. However, after recalculating the influence of positive political relations, it was found that Cai Jing’s ranking fell sharply, in line with expectations.

At the same time, these negative relationships are largely inseparable from the characteristics of the old party characters. The old party members mostly have works of literature, art, etc., and those who have passed on the historical materials, such as epitaphs, memorials, etc. In the impeachment and mutual debate, the non-political influence of the old party may show a stronger role.

Kinship Influence

In the study, it was found that the influence of relatives such as the Empress (called Taihou in Chinese) on politics cannot be ignored. Intuitively, when Shenzong was just in the throne and Zhezong was not in the pro-government period, he had to rely on the help of the nephews. The Cao Taihou in the Xi Ning period and the Gao Taihou in the Yuanyou period were all supporters of the old party. They were all around the emperor. Even the decisive power to the implementation of the decree. Zhang Hao had realized this problem, that is, the power to fight against the royal family also needs to come from the royal family, but he finally failed to achieve it. During Cai Jing’s administration, he continued the idea of the chapter, and Cai, who won the double support of the emperor and the royal family, was able to hold the political administration for many years. At the same time, however, the way of gradually approaching the old party in the mode of power struggle shows that it is more inclined to the nature of political struggle rather than the nature of reform, and it is difficult to have the effect of the new law advocated during the first Xifeng years.

Conclusion

This paper constructs a network of the Northern Song Dynasty Xifeng party-based people relationship based on the CBDB database, and regards it as a complex network, on which a framework method using serial pipeline is used. We first use BFS and constraints to construct the graph, and then use the Page algorithm to estimate the influence of different angles of the characters. Our experiments show that such a ranking method can benefit the research of history.

References


