

Marriage Network Analysis of Political Power in Pre-modern Goryeo Korea

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Outline

Introduction

Data and research tasks

Designing visualization system

Results & evaluation

Conclusion

Introduction

Political marriages

Political marriages have historically played a very important role in the ruling elite group to maintain or extend their power (e.g., Rollins Bahr, 1976).



Previous studies on political marriages

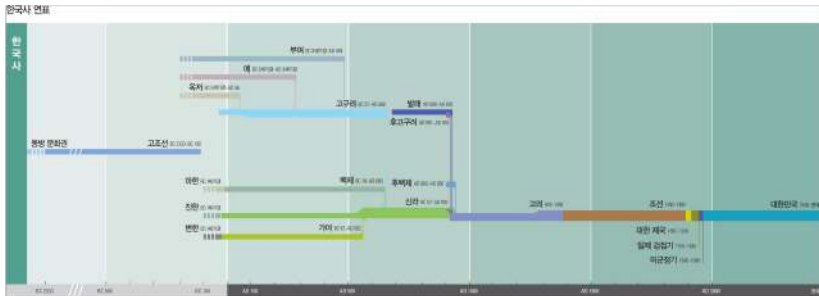
Studies on political marriages in Goryeo dynasty

- ▶ Ha, 1968
- ▶ Jeong, 1984
- ▶ Kim, 2009

Problem of political history

Due to the nature of political history, **it is difficult to cover long periods in a single paper**, which shortens the time frame that researchers can focus on with interest (Hong, 1995).

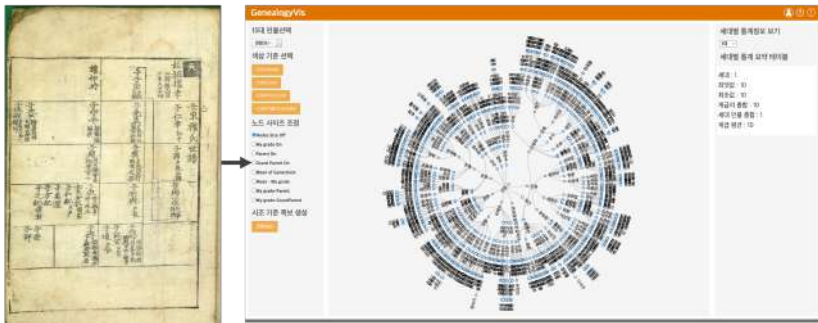
Time series data from early Korean history to modern times



Source: National Atlas of South Korea.

Visualization system for 安東權氏成化譜

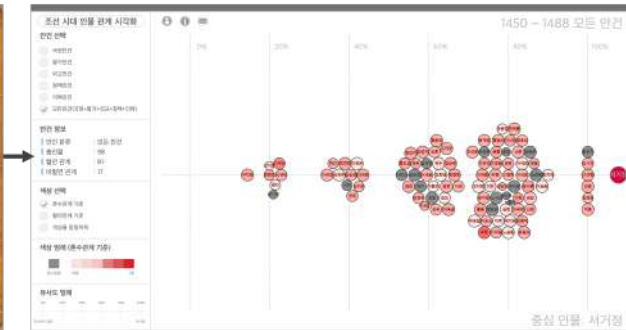
安東權氏成化譜



<https://seongmin-mun.github.io/VisualSystem/Minor/GenealogyVis/>

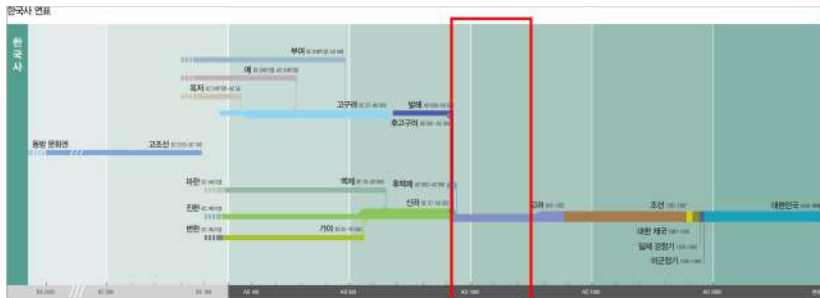
Visualization system for 朝鮮王朝實錄

朝鮮王朝實錄



<https://github.com/seongminmun/VisualSystem/tree/master/Major/BubbleJoseon/>

Time series data (Goryeo dynasty)



Source: National Atlas of South Korea.

History big data (time series; AD 918–1392)

Question: How did royal families of the Goryeo dynasty use marriage as a political strategy to maintain or extend their power?

What is Goryeosa [高麗史]?

Goryeosa [高麗史] is a government-published book of Goryeo dynasty's history (Kyujanggak, 2023).



Research tasks

- ▶ **RT.1:** Identify the relationships between individuals and explore the influences of individuals within marriage networks.
- ▶ **RT.2:** Explore the local influences within marriage networks based on their origin (region).
- ▶ **RT.3:** Simulate changes in relationships and local influences over time based on the Kings.
- ▶ **RT.4:** Analyze the detailed individual information included in the marriage network by origin.

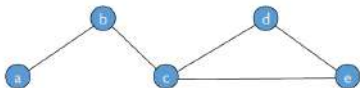
Designing visualization system

Research tasks

- ▶ **RT.1:** Identify the relationships between individuals and explore the influences of individuals within marriage networks.

Network visualization

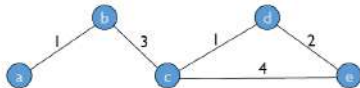
The network visualization expresses the relationship between pieces of information using nodes and links.



Undirected, binary



Directed, binary



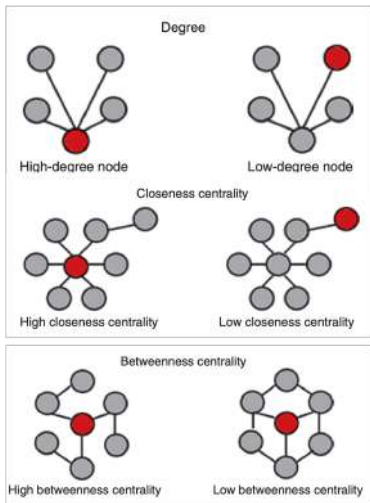
Undirected, Valued



Directed, Valued

Network analysis

For exploring the influences of individuals, we used three different centrality measures (i.e., degree, closeness, and betweenness).



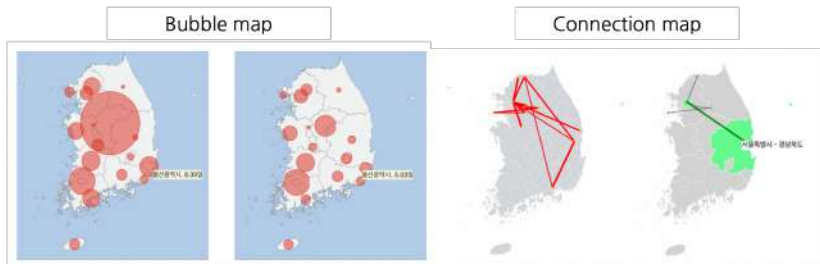
Jacunski & Tatonetti, 2013

Research tasks

- ▶ **RT.2:** Explore the local influences within marriage networks based on their origin (region).

Bubble & connection map

Bubble & connection map represents location data based on coordinates and visualizes regional/place differences by using the size of bubbles and links (Ryu Lee, 2021).



Ryu & Lee, 2021

Research tasks

- ▶ **RT.3:** Simulate changes in relationships and local influences over time based on the Kings.

Slider

The slider technique allows for visualizing data that changes over time.

Current king



Research tasks

- ▶ **RT.4:** Analyze the detailed individual information included in the marriage network by origin.

Table

To provide the details of the people on the marriage network, we used the table.

Selected people in social network

name	origins	score
Taejo (태조)	Gaegyeong (개경)	94
Janghwawanghu (장화왕후씨_태조2)	Naju (나주)	25
Yugeungdal (유궁달)	Chungju (충주)	25
Sinmyeongsunseongwangtaehu (신명순성왕태후유씨_태조3)	Chungju (충주)	24
Hyeong (혜조)	Gaegyeong (개경)	74

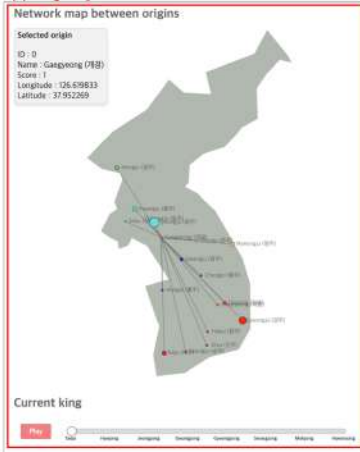
Results & evaluation

Case study 1

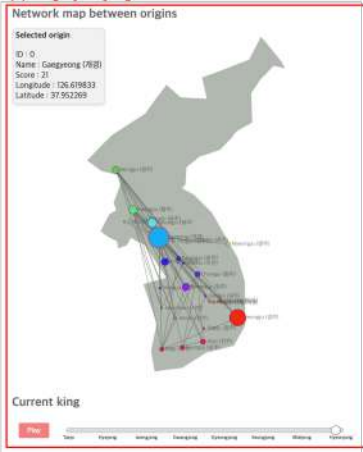
Question: How did the royal families of the Goryeo dynasty use marriage as a political strategy to maintain or extend their power?

Case study 1

(a) King Taejo



(b) King Hyeonjong



Case study 2

Question: Which origin generated the greatest power through the marriage network?

Case study 2

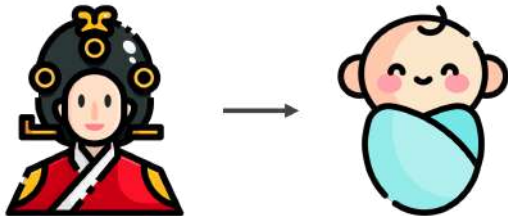
	Frequencies	Degree	Closeness	Betweenness
1st	Gaegyeong(21)	Gaegyeong(3.44)	Gaegyeong(11.34)	Gaegyeong(0.85)
2nd	Gyeongju(16)	Hwangju(0.96)	Gyeongju(7.95)	Jeongju(0.04)
3rd	Pyeongju(9)	Jeongju(0.75)	Pyeongju(4.46)	Hwangju(0.03)
4th	Hwangju(8)	Chungju(0.66)	Hwangju(4.21)	Chungju(0.03)

Table 1 Ranking of important origins according to frequencies and network analysis algorithms (including all marriage network data from King Taejo to King Hyeonjong).

Case study 2

	Frequencies	Degree	Closeness	Betweenness
1st	Gaegyeong(21)	Gaegyeong(3.44)	Gaegyeong(11.34)	Gaegyeong(0.85)
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4th	Hwangju(8)	Chungju(0.66)	Hwangju(4.21)	Chungju(0.03)

Table 1 Ranking of important origins according to frequencies and network analysis algorithms (including all marriage network data from King Taejo to King Hyeonjong).



In addition to the case studies, we conducted **a user study** to evaluate the effectiveness of our visualization system (e.g., Hou et al, 2023; Chen et al, 2023).

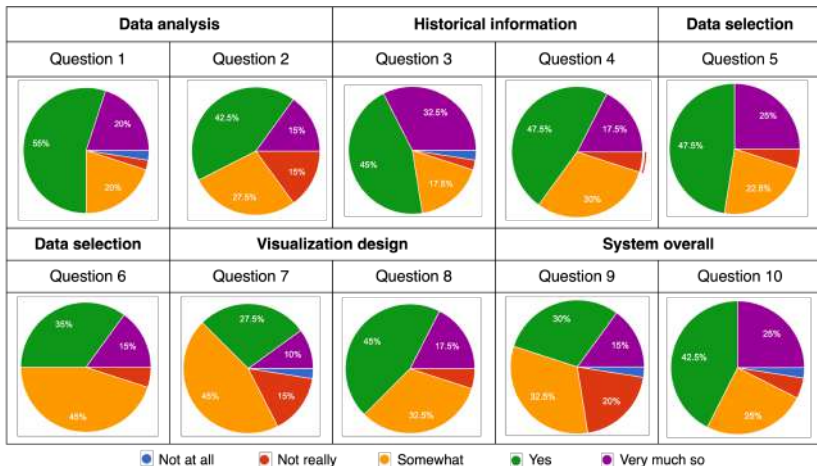
User study

- ▶ The study involved a sample of 40 individuals who were humanities students with background knowledge of history.
- ▶ Data were collected for 7 d, from March 20 to March 26, 2023.
- ▶ The study used a questionnaire with Likert 5-point scale questions.

User study

	Number	Question
Data analysis	Q1	Patterns of data that change over time (dynasty) can be identified.
	Q2	Data Patterns that change depending on the network centrality calculation method can be identified.
Historical information	Q3	The political marriage strategies of the Goryeo royal family can be understood.
	Q4	Important figures in the marriage network of the Goryeo royal family can be identified.
Data selection	Q5	Only desired specific data can be selected.
	Q6	Desired network centrality calculation method can be selected.
Visualization design	Q7	The information presented in the visualization can be understood without separate explanations of the visualization system.
	Q8	Desired regional information can be distinguished without separate explanations of the visualization system.
System overall	Q9	The operation of the system can be understood without separate explanations.
	Q10	The system operates smoothly.

User study



Conclusion

Conclusion

- ▶ Political marriage was an important strategy for maintaining or extending power during the Goryeo dynasty.
- ▶ The power of an origin was higher when the king was produced through marriage (i.e., Jeongju).
- ▶ The proposed visualization system can be useful for historians to analyze political history records.

Thank you.