

Assignment 3 :

Network analysis and Global supply chain

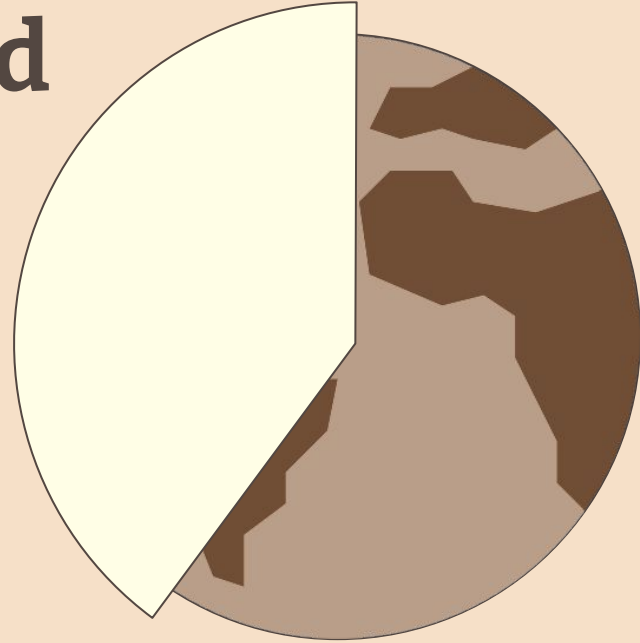
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Introduction

Network Analysis



- Network Analysis is useful in many living application tasks.
- It helps us in deep understanding the structure of a relationship in social networks, a structure or process of change in natural phenomena, or even the analysis of biological systems of organisms.

What Is a Global Supply Chain?

- Global supply chains are networks that can span across multiple continents and countries for the purpose of sourcing and supplying goods and services.
- involve the flow of information, processes and resources across the globe.



Introduction

We analyzed **centrality of indices** for **electronic industry** and **automotive industry**

Electronic industry



China - China's production recorded the **largest world market share** for its electronics exports.



Korea - The growth propelled the country to become the **third-largest producer of electronics** in the world.



Japan - The share of Japanese electronics companies has **significantly declined from its peak due to competition** from South Korea, Taiwan, China, and the United States.



Taiwan - Taiwan is mostly known for exporting all sorts of electronics. It includes **final products** such as notebooks, but also **countless component**.

Automotive industry



EU - The EU is the sector represents **the largest private investor** in research and development (R&D).



USA - The United States was **the first country in the world to have a mass market** for vehicle production and sales.



Japan - The automotive industry is **an essential pillar of Japan's economy**.



Korea - The automotive industry in South Korea is **the fifth-largest in the world** as measured by automobile unit production.

Introduction

Source

Methodologies

Result

Summary

Sources of data



**World Input-Output
Database (2000-2014)**



<http://www.wiod.org/home>

Briefs of analytical Methodologies

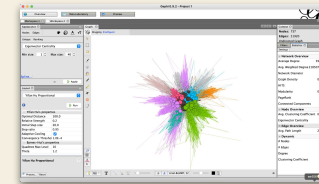
Analytical Methodologies

- Import “*World Input-Output tables*” of 2000-2014 to “*Gephi*”
- Calculate all *Network Indicators* and generate the *Network Diameter*
- Use and export *all computations of network indicators* from Data Laboratory
- Import *Closeness centrality* and *Eigenvector centrality* of *Electronic industry of China, Korea, Japan, and Taiwan*
- Import *Closeness centrality* and *Eigenvector centrality* of *Automotive industry of Europe, Korea, Japan, and USA*
- Use *Excel* to create the *Electronic and Automotive industry comparison graphs* of those selected countries

Programs



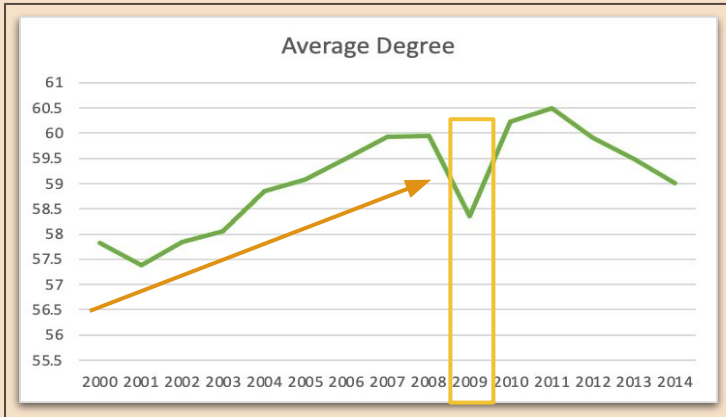
Examples



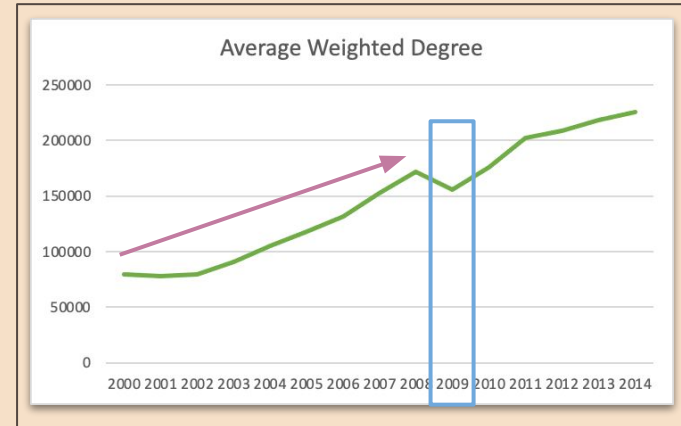
	Closeness	Eigenvector
CHN_r17	0.550746	0.711558
CHN_r20	0.497305	0.345688

Average Degree	
2000	57.823
2001	57.391
2002	57.848
2003	58.049
2004	58.855
2005	59.083
2006	59.502
2007	59.929
2008	59.951
2009	58.355
2010	60.231
2011	60.488
2012	59.905
2013	59.484
2014	59.001

Task#1: Comparison of main network indicators

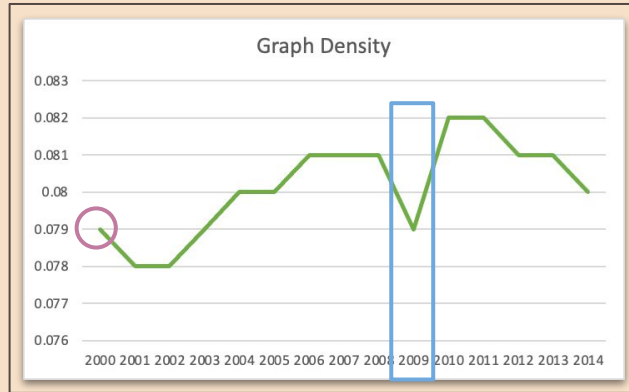


- In 2000, each industries had around 57 links
- Fluctuation and inconclusive direction
- **Increase over the time** (2000-2008)
- Due to the Global Financial Crisis, it **dramatically dropped in 2009**

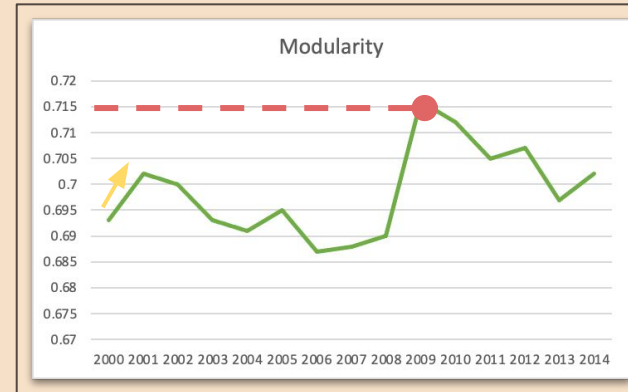


- **Continuously increasing**
- The Global Financial Crisis also impacted this indicator to **drop a little bit**

Task#1: Comparison of main network indicators

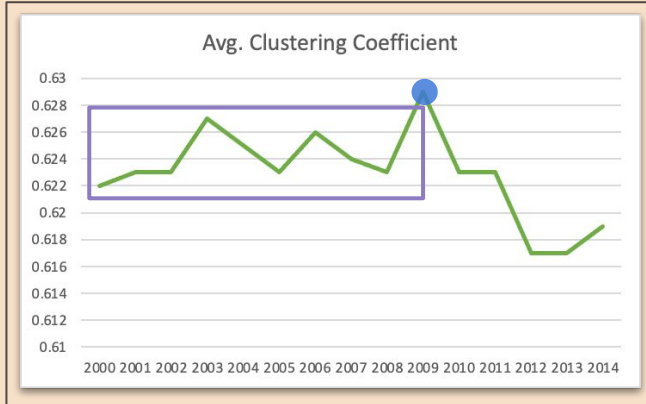


- The original data had around 0.079
- Inconclusive direction
- Global Financial Crisis **negatively impacted this indicator in 2009** - becoming more isolated in each industry

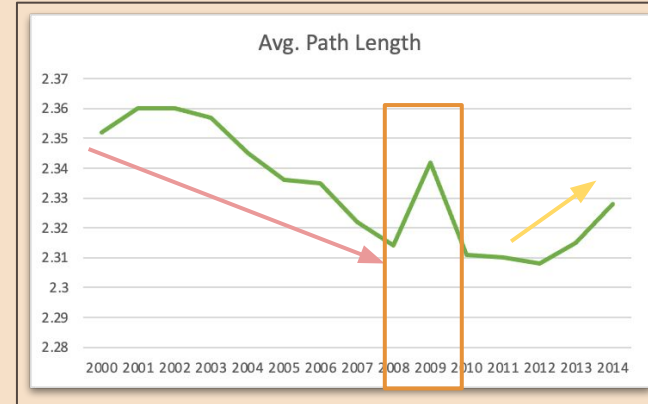


- **Increasing a little bit in the begin** and decreasing over the time (volatile direction)
- In 2009, it rapidly rose to over **0.715** since the world trade has been collapsed; it had higher opportunity to separate the network into smaller supply chain

Task#1: Comparison of main network indicators



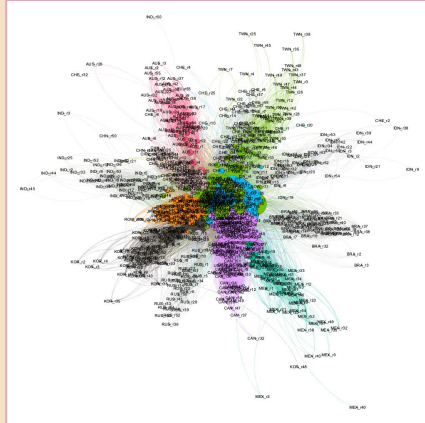
- **Undulating direction** during the time frame
- During the crisis, the value was high so the **dominant of the network just belong to some industry**



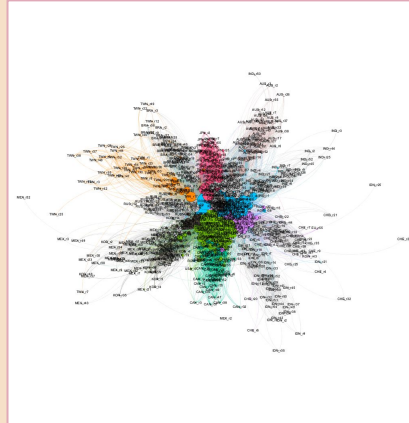
- It **declined over the time** until the crisis happened
- The **indicator sharply increased in that period and started decreasing later on**
- After that, it **gradually increased again**

Task#1: Comparison of main network indicators

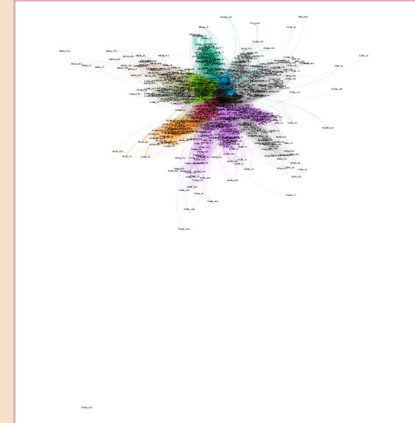
Network diameter (2000)



Network diameter (2009)

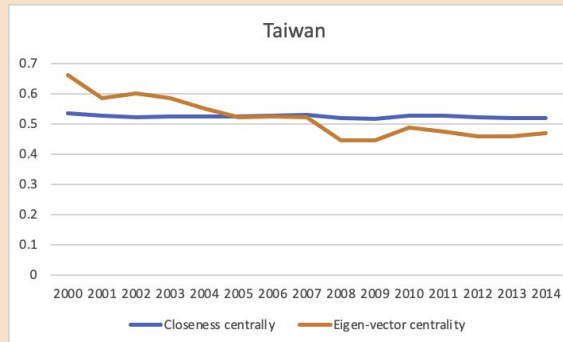
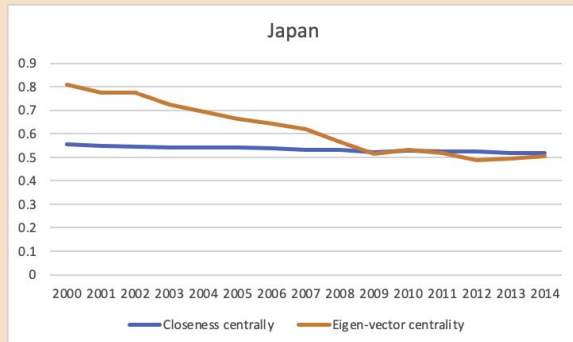
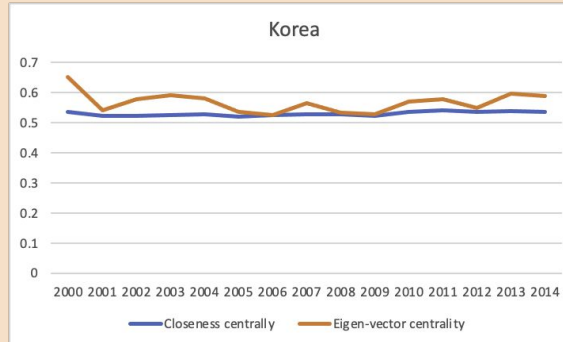
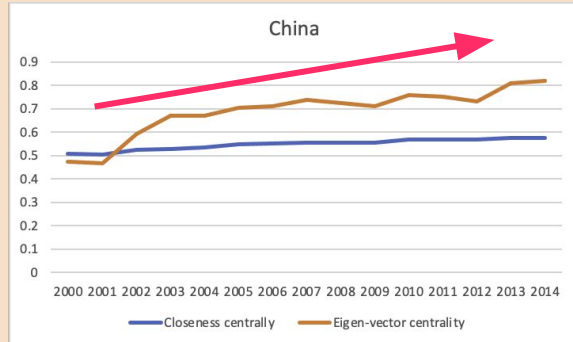


Network diameter (2014)



“The values of network diameter remain stable”

Task#2: Centrality indices of electronic industry

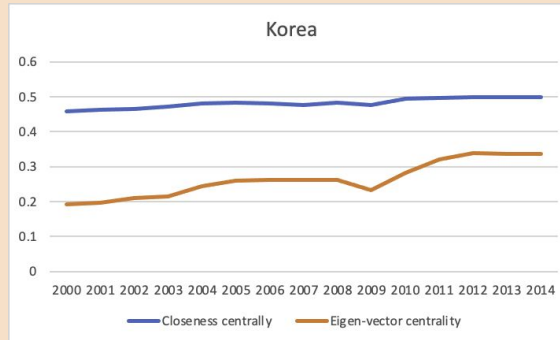
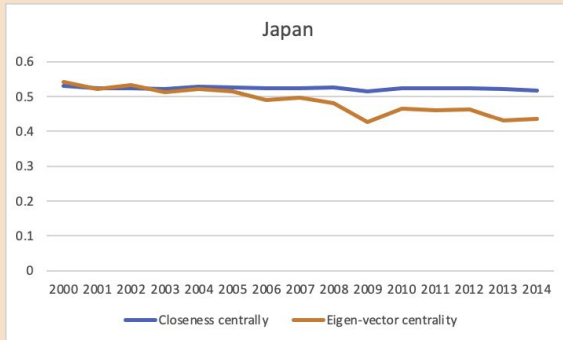
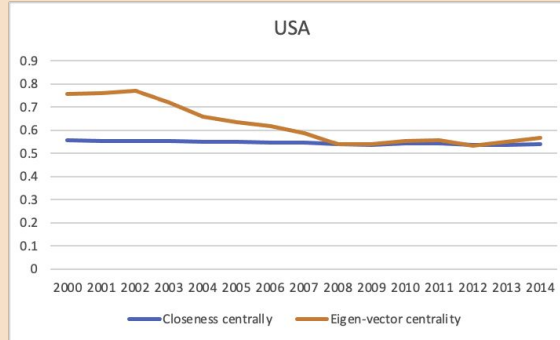
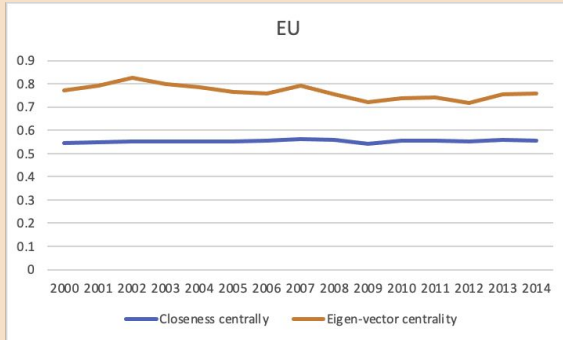


→ **China** is the only country that has an **increasing trend of Eigenvector** centrality while Japan and Taiwan are decreased, and Korea is fluctuated.

→ **Closeness centrality** of each country are **quite stable at 0.5**

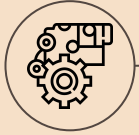
→ The **decreasing centrality in Japan and Taiwan** indicate that this industry had been smaller and less significant to its economy

Task#3: Centrality indices of automotive industry



- Closeness Centrality of each country are quite stable at 0.5
- EU had the highest and the stablest centrality in this period of time
- Due to the chip shortage situation, it highly affect the automotive industry since it force the auto production to slow down or delay
- USA Eigenvector centrality are sharply decreased since 2002

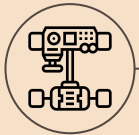
Summary and Policy



Electronic and Automotive industries get affected the most from GFC



The electronic industry is highly significant to the automotive industry due to the chip shortage in electronic industry has a huge effects on the production in automotive industry.



The automotive industry should improve the inventory planning or stock more supplies to prevent the shock from the other industries.



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THANK YOU

