



Visualizing the Structure of Scientific Output of Iranian Scholars in Science Citation Index (SCI) during 2000-2006

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Introduction

- After our Revolution in 1978, formally the issue of **producing science** in Iran was considered as follows:
 - in 1986 this issue was raised in Tehran University for the first time ;
 - during 1993-1994 the topic of producing science was studied more seriously;
 - in 1997 the “Conference of Methodology and Research Techniques in scientific production” was held in Tehran by Research Deputy of the University of Tehran;
 - since 1999 the Ministry of Science, Research, and Technology (MSRT) initiated to encourage the Iranian scholars to produce more scientific documents and publish them in accredited national and/or international journals;



Objectives of the research

- The main purpose of this research is to study the quality and quantity of the Iranian scientific products using visualization techniques during 1990-2006.
- To achieve this goal, we have studied the history of science and recognized the productive and influential authors, based on citations on both local citation scale (LCS) and global citation scale (GCS).
 - LCS citations received from the retrieved collection (for this study) to retrieved docs.
 - GCS citations to the retrieved collection from WOS.



Research questions

1. How is the structure of science (map) of Iranian scientific products in WOS during 2000-2006?
2. What are the most important scientific clusters formed in scientific products during the research period? And what are their subject areas?
3. Who are the most productive and influential (based on citations) Iranian authors in WOS?
4. What are the influential articles based on GCS and LCS citations and their date of publication?



Research methodology and data gathering:

- The population of this research contains 24480 documents by Iranian authors, indexed in SCI database and accessible from WOS during 2000-2006.
- Data was gathered and analyzed in 3 steps and using 3 tools:
 - In the first step, data was extracted by using SCI database via WOS in plain text formats;
 - In second step, we analyzed data using ISI.exe software to recognize co-authors;
 - and in the third step, data was entered into Excel software to be ready for analysis.
- In order to draw the historigraphic map of Iranian scientific products in SCI, we used HistCite™ software. This software is a production of ISI (now Thomson Reuters). Its input is citation data, indexed in WOS and the output is a graphical image of scientific products.



Results of the study: (Historiographic Map)

- For this research the Historiographic map has been drawn in two separate parts by HistCite software:
 - 1. Global citation scale (GCS) map. In this section 300 (out of 24480) most cited documents have been selected by the software for GCS analysis.
 - 2. Local citation scale (LCS) map. In this part of the analysis, to have a more clear graph, only 200 documents (due to the high number of citations) were selected by HistCite.



Historiographic Map (cont...)

- In GCS map only 2 clusters were observed. Cluster 2 consists of 3 sub-clusters.
- In LCS map we observed 6 clusters.

Cluster 1 based on GCS citations

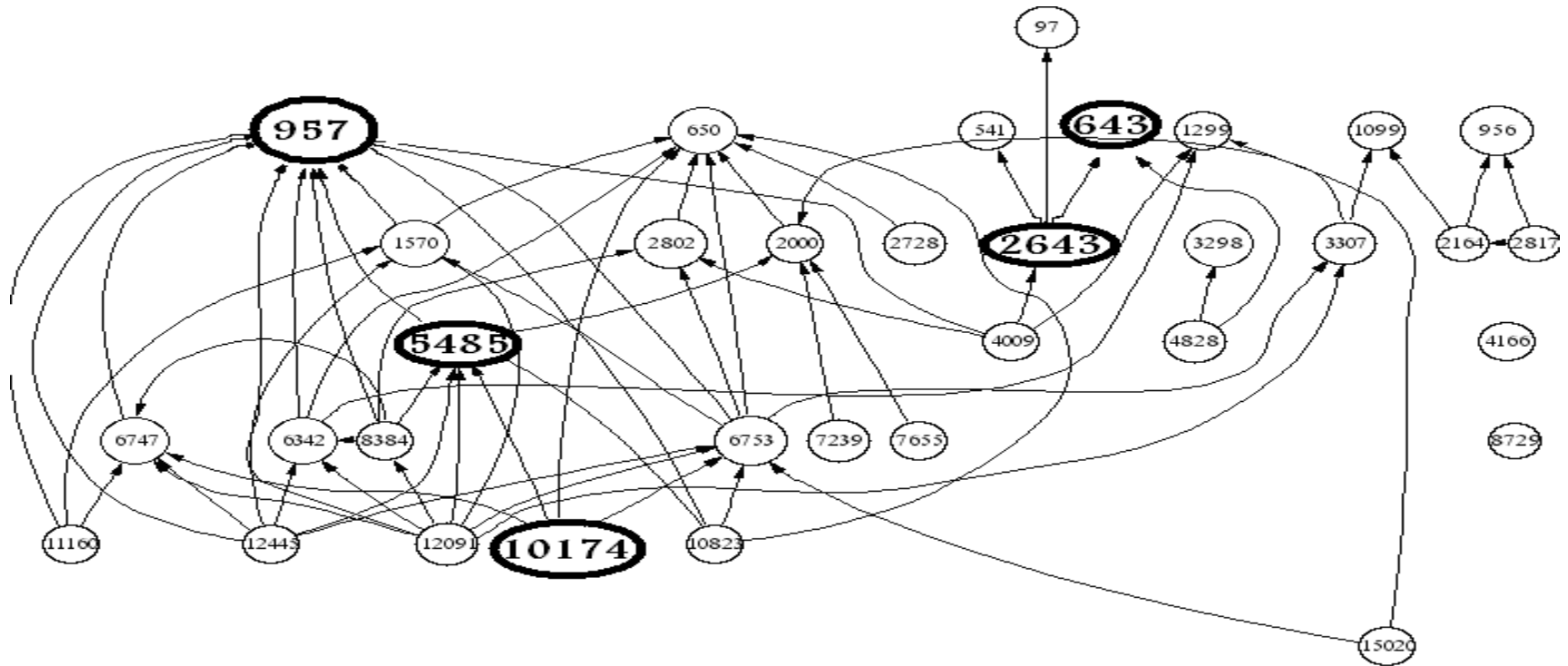


Figure 1: Cluster 1(membrane electrode)

Cluster 2: a large and separable cluster (includes 3 sub-clusters)

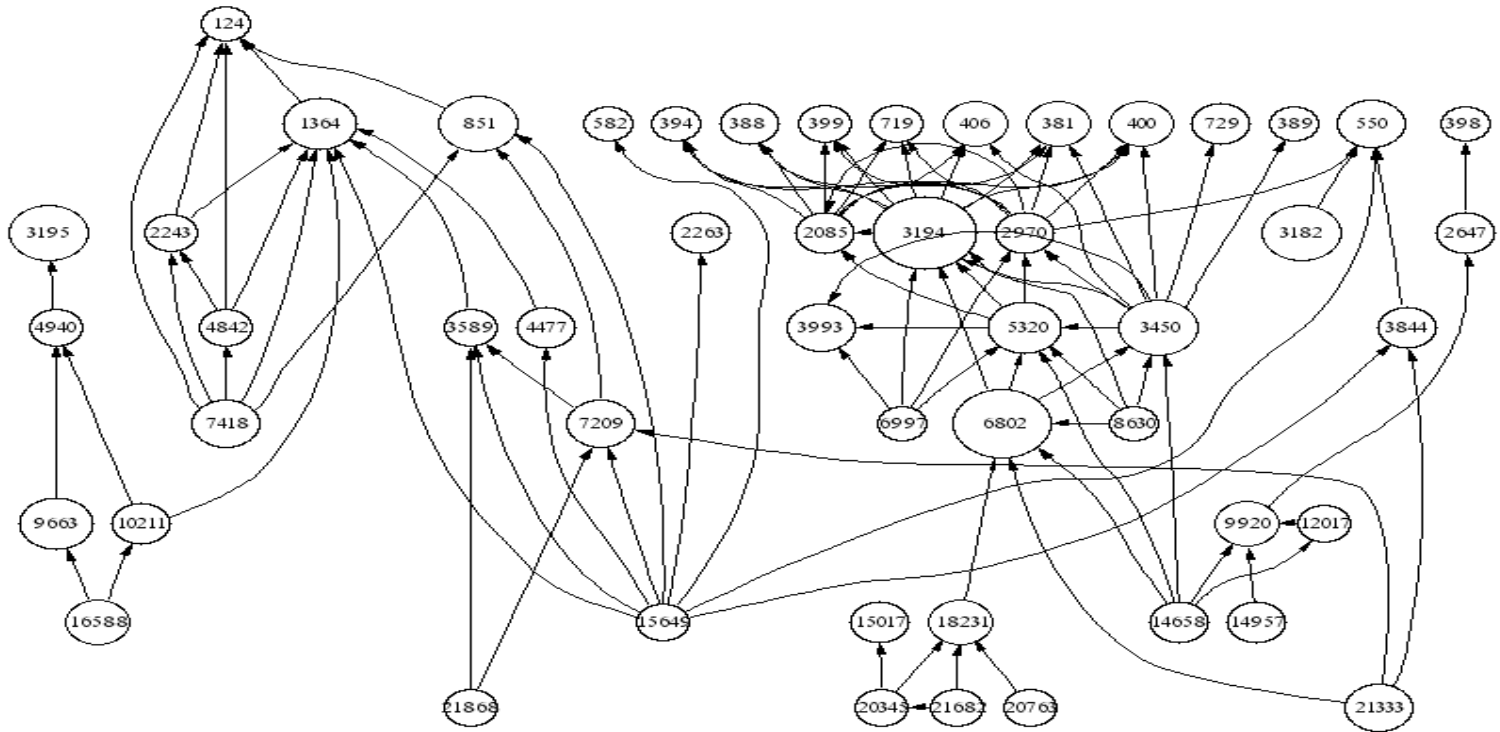


Figure 2. Cluster 2 based on GCS citations

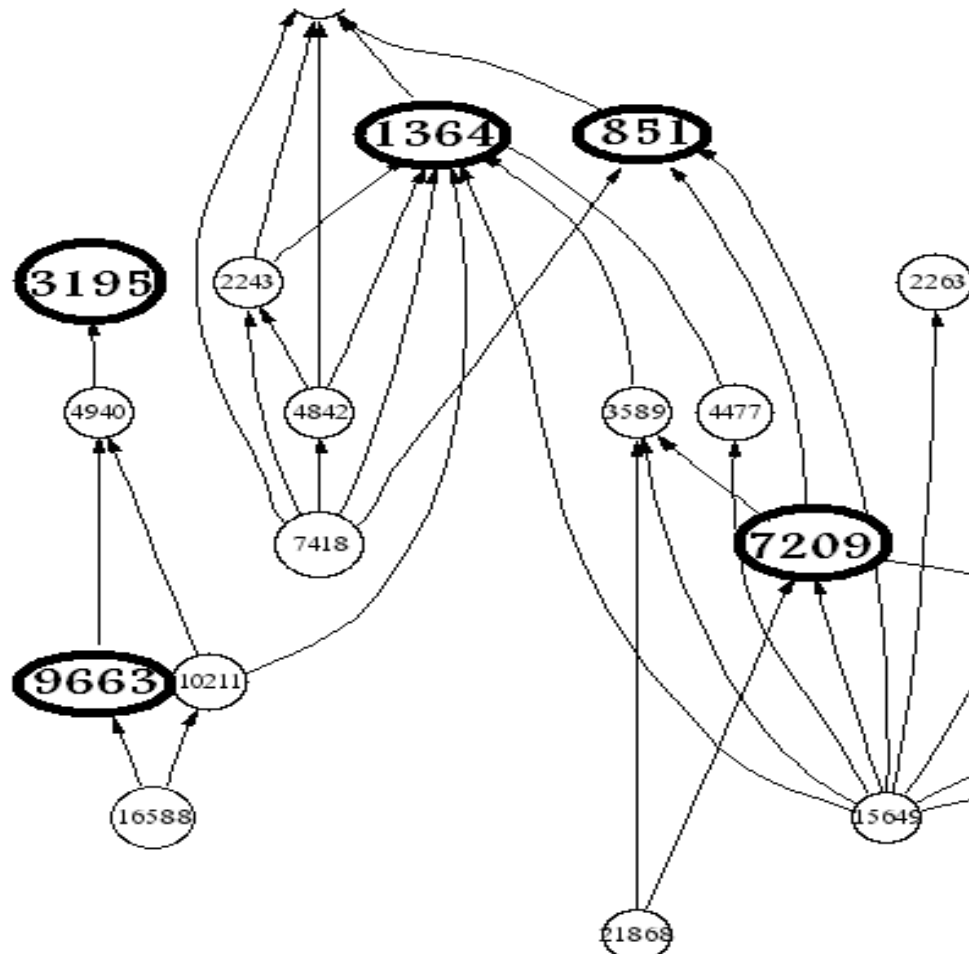


Sub-cluster1 of cluster 2 (formed during 1999-2006)

- This sub-cluster is established by 7 authors ([Kaboudin](#), Karimi, Azizi, Firouzabadi, Habibi, Saidi, and Heravi).
- The subject area of this cluster is ‘operation on hydrocarbons’.

Sub-cluster 1 of cluster 2 (in 'operation on hydrocarbons')

Figure 3: Sub-cluster 1 from cluster 2





Sub-cluster 2 from Cluster 2 (formed during 2000-2006)

- This cluster is about “oxidation”, “nitrogen” and “catalyst” in the area of Organic Chemistry. The most important document in this sub-cluster is entitled "Silica sulfuric acid/ NaNO_2 ..." by Zolfigol with 123 GCS and 71 LCS. Publication date of this document is 2001.

Sub-cluster 2 of cluster 2 (formed during 2000-2006)

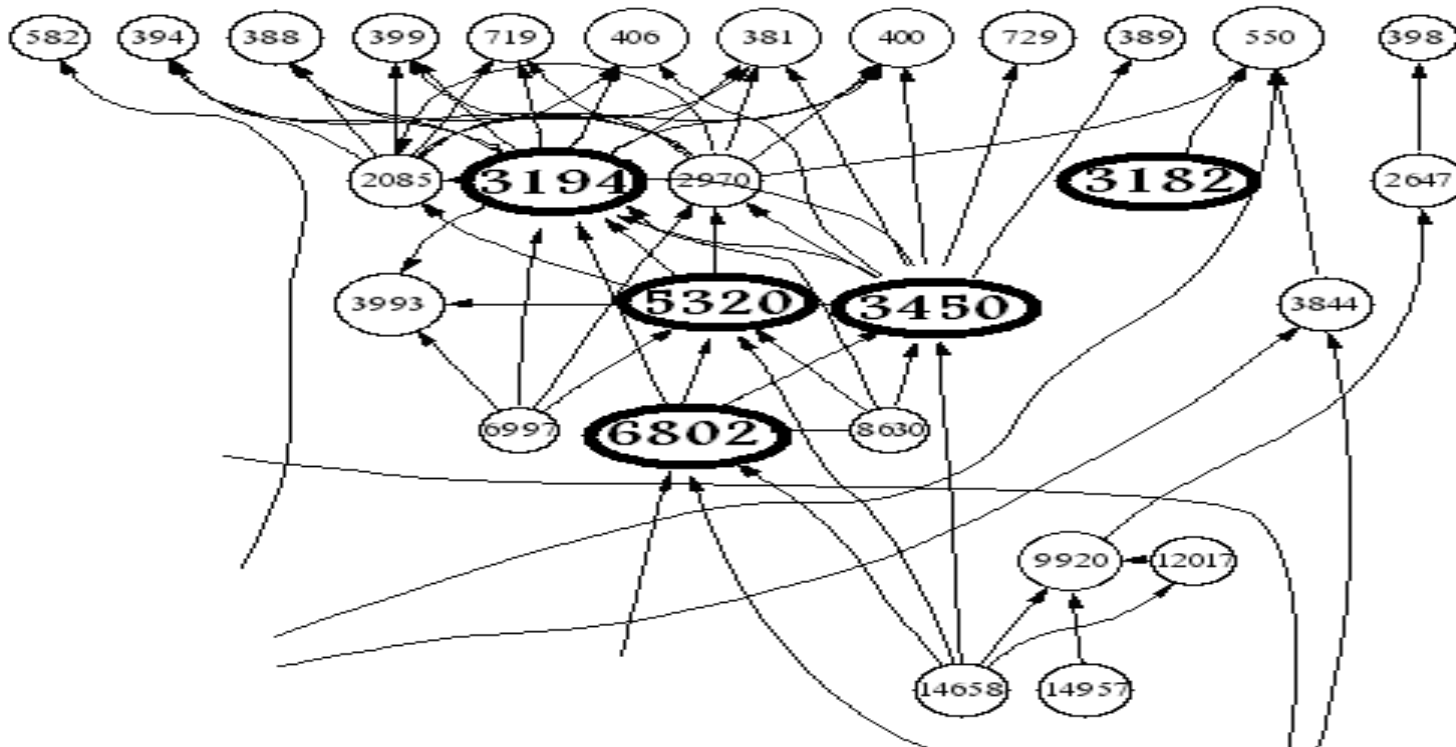


Figure 4: Influential documents with the most GCS



Sub-cluster 3 from cluster 2 (formed 2005-2006)

- This is a small sub-cluster with 5 documents and produced by collaboration of 2 Iranian first authors (Heravi (3 articles)) and Bamoharram (2 articles)). Its subject area is in “Catalysts”.

Sub-cluster 3 cluster of cluster 2 (2005-2006)

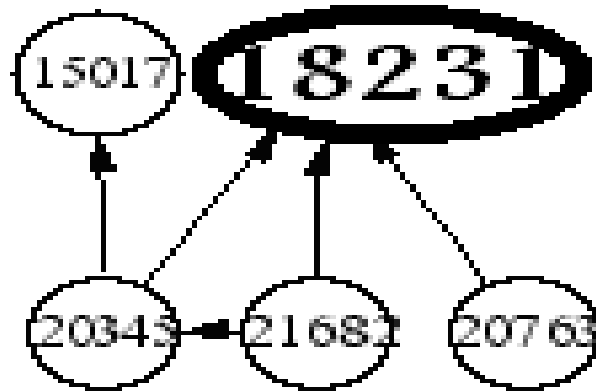


Figure 5: Sub-cluster 3 from cluster 2 in “catalysts”



Clusters in SCI based on LCS Map

- We observed 6 clusters in scientific products of Iranian authors in SCI during the research period.
- Cluster number 3 formed during 2000-2005:
- Zolfigol produced 20 documents out of 29 in this cluster. One of his documents numbered 3194 ranked the first as the most influential document in LCS citation map as well as in GCS map. Like other clusters in this research, the first authors in all documents of this cluster are from Iran ([Table 6](#)).



Cluster 3 based on LCS (formed 2000-2005)

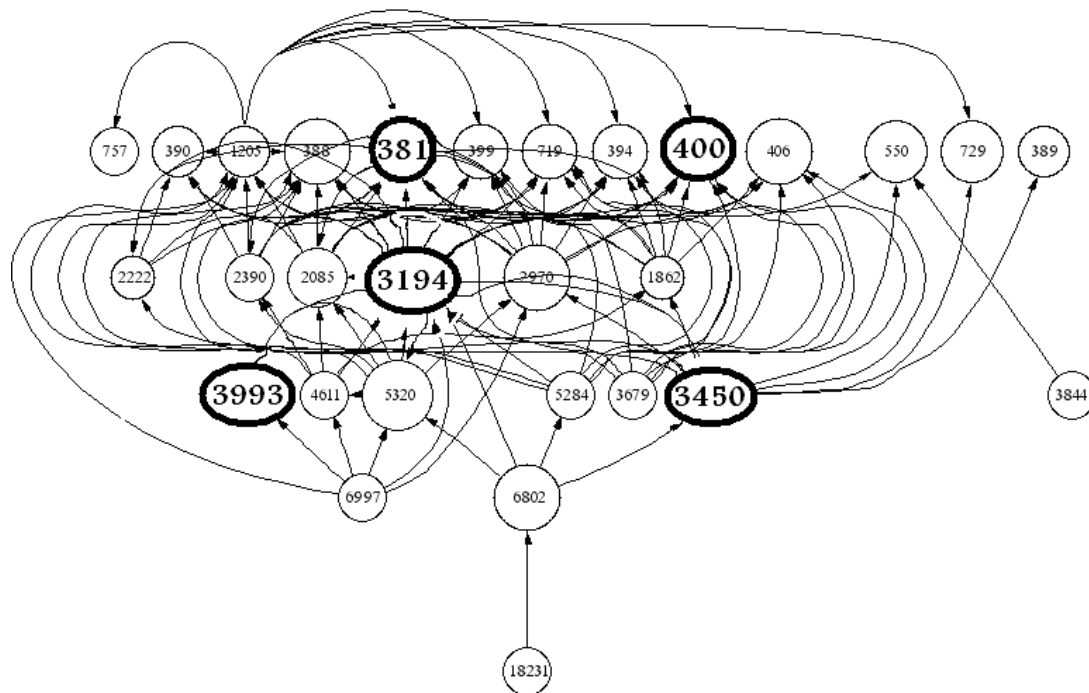


Figure.6: Cluster 3. Iranian Documents in SCI with the most GCS citations



Cluster 4 in LCS citations

- This cluster includes 9 documents produced by 2 Iranian first authors (Moghimi (5 articles)) and Ranjbar (4 articles)). It was established during 2001-2005. Its subject area is about “crystal structure”.



Cluster 4 based on LCS citations (formed during 2001-2005)

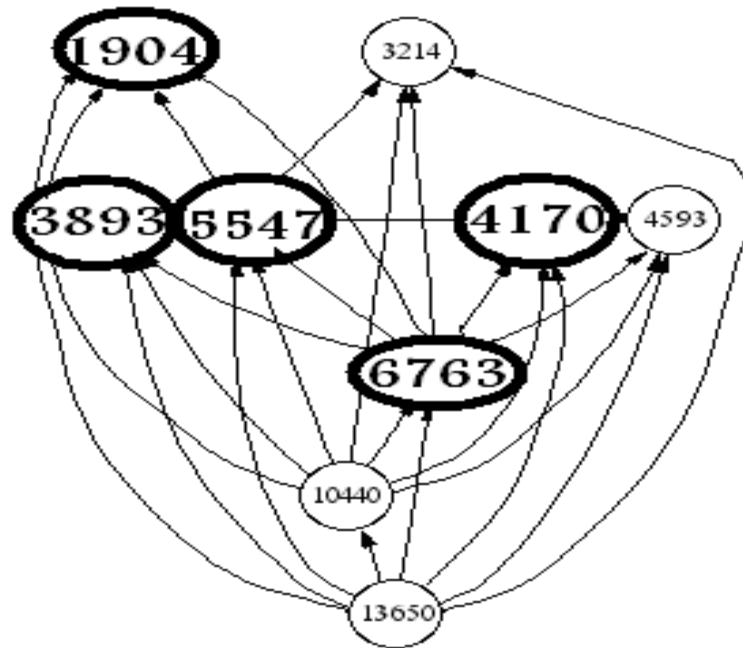


Figure7. Cluster4. in Crystal structure



Cluster 5 based on LCS citations

- The subject area of this cluster is about “electrochemical analysis”. It has 29 documents with collaboration of 7 Iranian first authors (Shamsipour (10 articles), Shahrokhian (1 article), Ganjali (12 articles), Javanbakht (1 article), Musavi (3 articles), Rahmani (1 article) and Bagheri (1 article)). This cluster was established during 1999-2004 in local citation scales.

Cluster 5 (formed during 1999-2004)



Figure 8. Cluster 5. Electrochemical analysis



Cluster 6 based on LCS

- This cluster has 7 documents produced by one Iranian first author (Salavati niaseri). Its subject was about “macro cycles” and established during 2003-2005.



Cluster 6 based on LCS citations (formed 2003-2005)

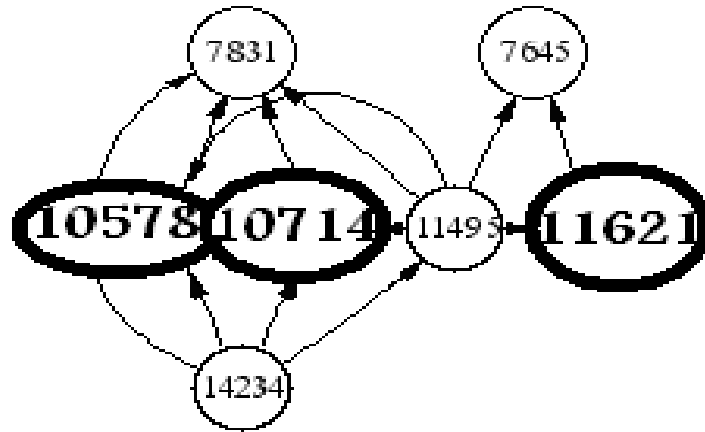


Figure9. Cluster 6. in Macro cycles



Cluster number 7

- This cluster has 9 documents produced by 4 authors (Karimi (3 articles), Firouzabadi (3 articles), Azizi (1 article) and Saidi (2 articles)) and was established during 1999-2004 in the subject area of 'Aliphatic' and 'Aromatic complexes'.



Cluster 7 based on LCS citations

(formed 1999-2004)

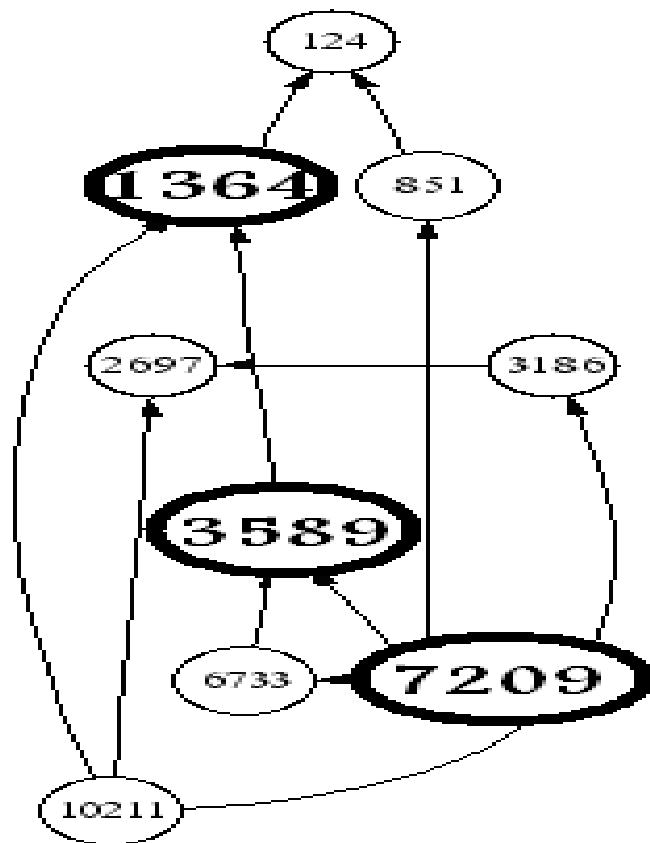


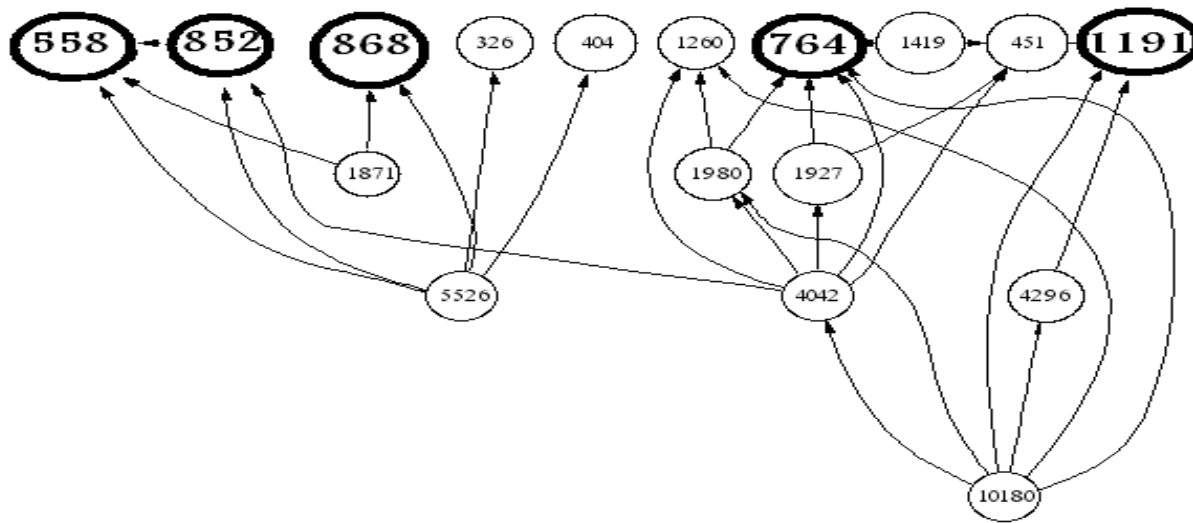
Figure 10. Cluster 7. Aliphatic and Aromatic



Cluster 8 based on LCS

- Cluster number 8 was established by 17 documents by collaboration of 2 Iranian first authors (Hajipour (7 articles) and Malekpour (10 articles)) during 2000-2004 in the area of “Polymer”.

Cluster 8 based on LCS citations



[Figure11](#).Cluster 8. in Polymer



Discussion & Conclusion

- Totally the trend of scientific production in the period of this research was increasing and the scientific products of Iran from 2000 to 2006 shows a growth rate of 4.23%.
- The most participant author in the clusters of this study was Firouzabadi whom participated in 2 sub-clusters of cluster 2 (in GCS) and 2 clusters in LCS map.
- Among all 8 clusters, 1 cluster was established by only 1 author (cluster 7), and 2 clusters were formed by participation of 2 authors, (clusters 4 & 8). Other clusters had been established with the participation of more than 2 authors.



Discussion and conclusion cont..

- This study showed that almost all clusters were in chemistry subject area, mostly in organic chemistry and after that in analytical chemistry. This result supports one of Osareh & McCain's (2008) findings in which the most clusters were in Organic chemistry and some of them in analytical Chemistry.



Thank you very much
for your attention
Any question, comment...?