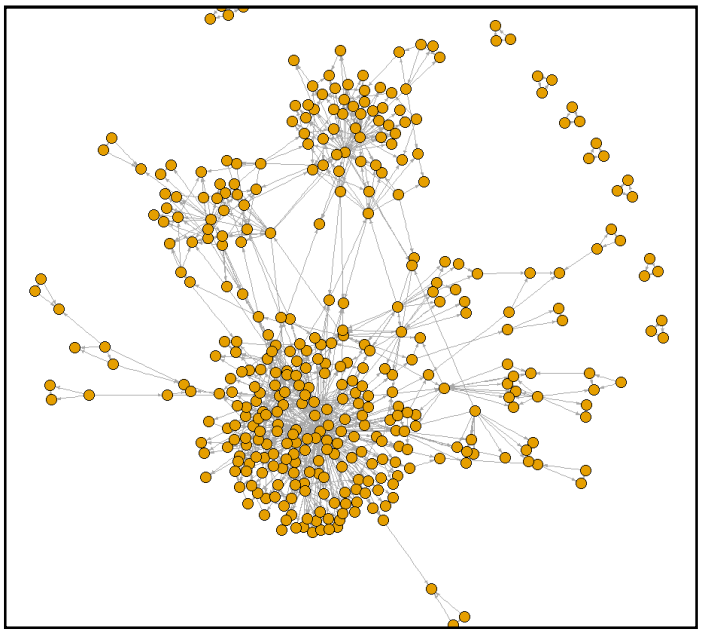
NETWORK STRUCTURE:

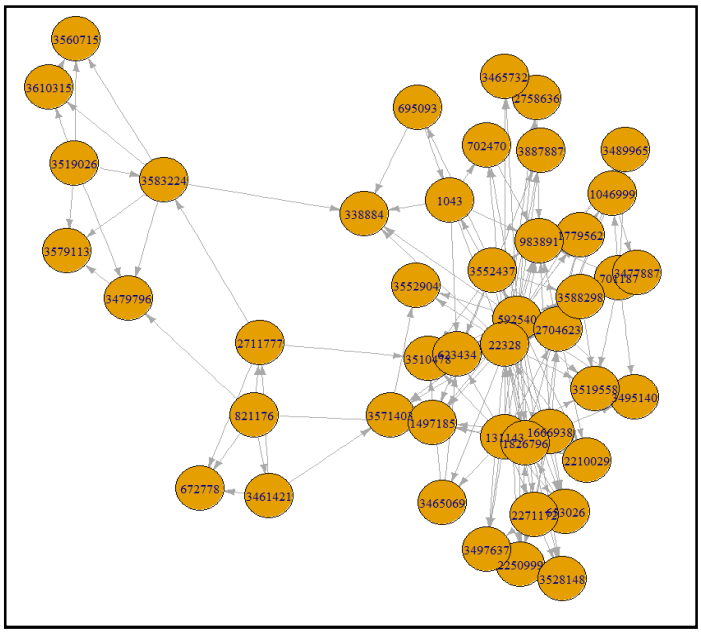
The SAP Online Knowledge Community Network is a very diverse network with very low cohesion. This network is a result of answering questions or asking questions.Subsequently there are many weak ties in the network.



As can be clearly seen from the graph alongside of cliques of 3 in the network, there are many cliques that are not related to the other cliques in the network and are dissipating knowledge among themselves.

However, these unconnected cliques also give rise to the possibility of multiple weak ties getting formed as soon as a clique has the knowledge required by the other unconnected cliques in the network.

Fig 1 : Cliques of size 3. There are many cliques which are not connected to each other.



The graph of cliques of 4 plotted alongside show that a few cliques are formed because of weak ties between nodes.

Consider the tie between the node 35832224 and 338884. The node 35832224 has answered a question posed by 338884. Node 35832224 probably got this knowledge from its own closely knit community or from the knowledge given to it by its weak tie with another node 2711777.

This clearly illustrate the concept of the "strength of weak ties". The community of node 338884 now has the knowledge from the community of node 3583224 because of the weak ties between the two nodes.

Fig 1.1 : Cliques of size 4. Some of these cliques are formed because of weak ties.

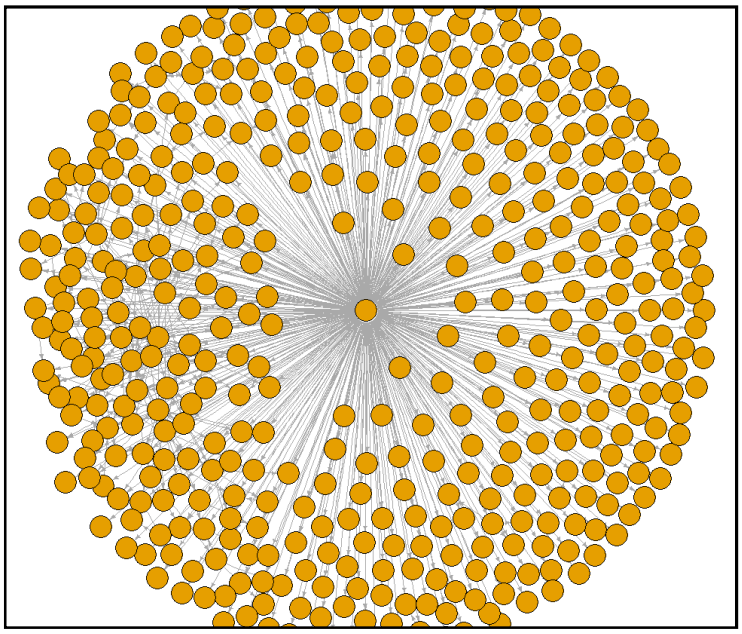
Some network statistics are as follows:

No of edges: 4120
No. of vertices: 3415
Highest degree: 454
Reciprocity: 0.005825
Global Clustering: 0.009986

The network graph is neither weakly connected nor strongly connected. The low reciprocity suggests that there are very few mutual links in the network and the low global clustering coefficient provides evidence of a highly diverse network.

INTERESTING OBSERVATIONS ABOUT SOME NODES:

- **DEGREE CENTRALITY:**

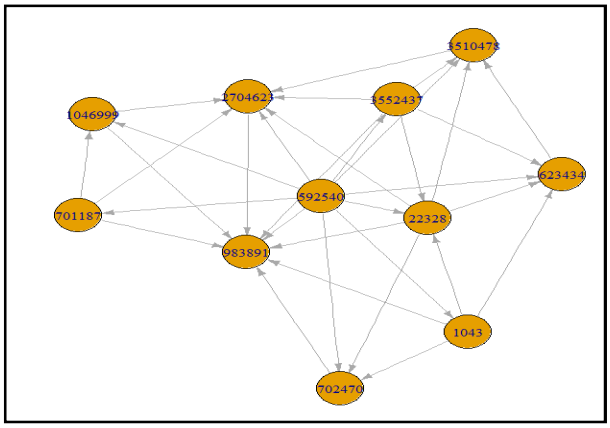


Indegree: 2, Outdegree: 452
Betweenness Centrality rank: 3
Closeness centrality rank: 31.
Degree Centrality rank: 1

This node has the highest degree in the network, however it ranks low in closeness centrality. This shows that the node "592540" is influential in only a particular part of the network and is located a bit further away from the center of the network.

The high outdegree of the node suggests that this is "knowledgeable" node and most information in the neighbourhood of this network is being dissipated by this node.

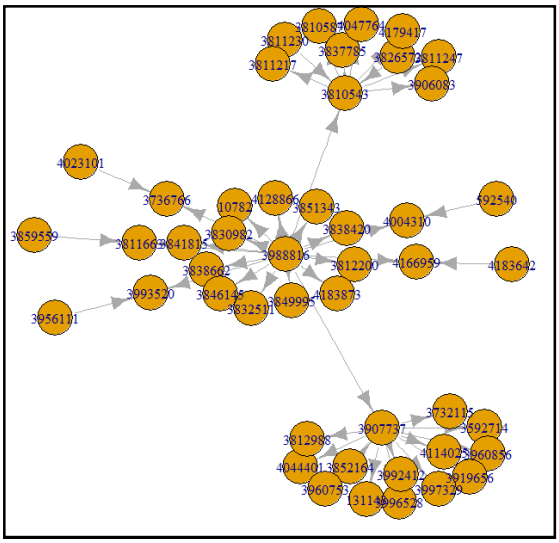
Fig 2 : Ego network of the node of highest degree



As can be seen from the graph in Fig 2.1, all the cliques of size 5 have been formed because of the node "592540". All of these cliques have been formed because node 592540 answered the questions posed by the other nodes in the cliques.

Fig 2.1 : Cliques of length 5

- **CLOSENESS CENTRALITY:**

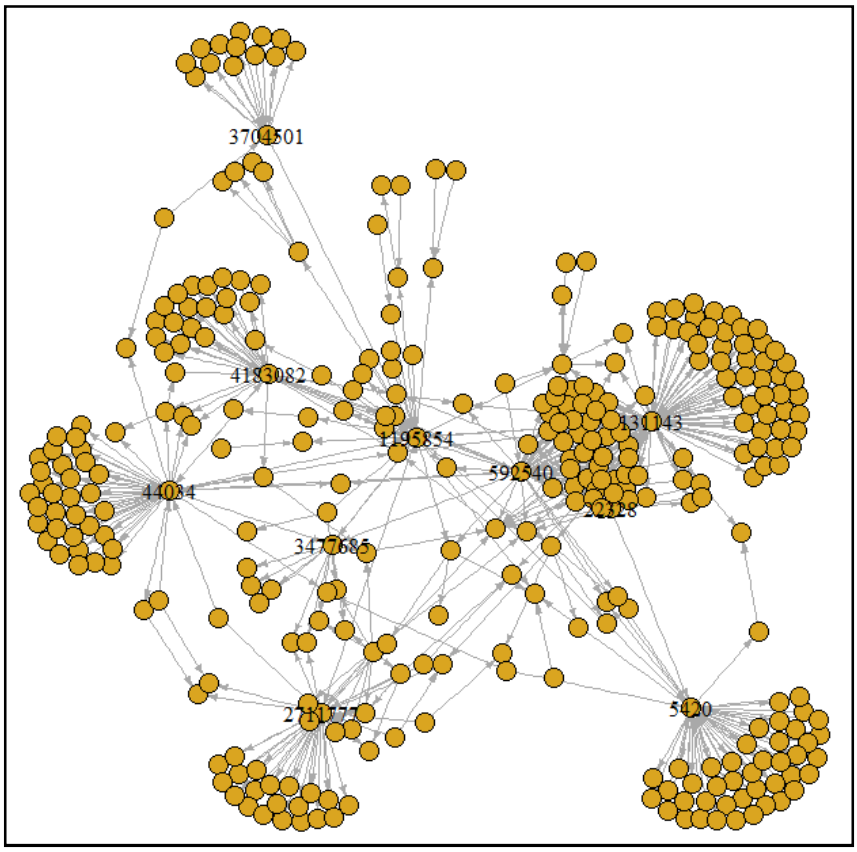


Indegree: 0, Outdegree: 19
Betweenness Centrality rank: 1901
Closeness centrality rank: 1.
Degree Centrality Rank: 36

The node 3988816 ranks very low on betweenness centrality. However, it has the highest closeness centrality. This shows that this node is close to many other nodes in the network. However, it is not the only node that is close to other nodes. This node has multiple paths in the network.

Fig 3. The ego network of the node with highest closeness centrality: 3988816

- **BETWEENNESS CENTRALITY:**



Degree rank: 21
Betweenness Centrality rank: 1
Closeness centrality rank: 33

The node 1195854 has the highest betweenness centrality but has a relatively low degree. This means that the few weak ties that node 1195458 has are crucial for knowledge flow in the network.

Fig 4. Ego network of order 2 of the node with highest betweenness centrality 1195854

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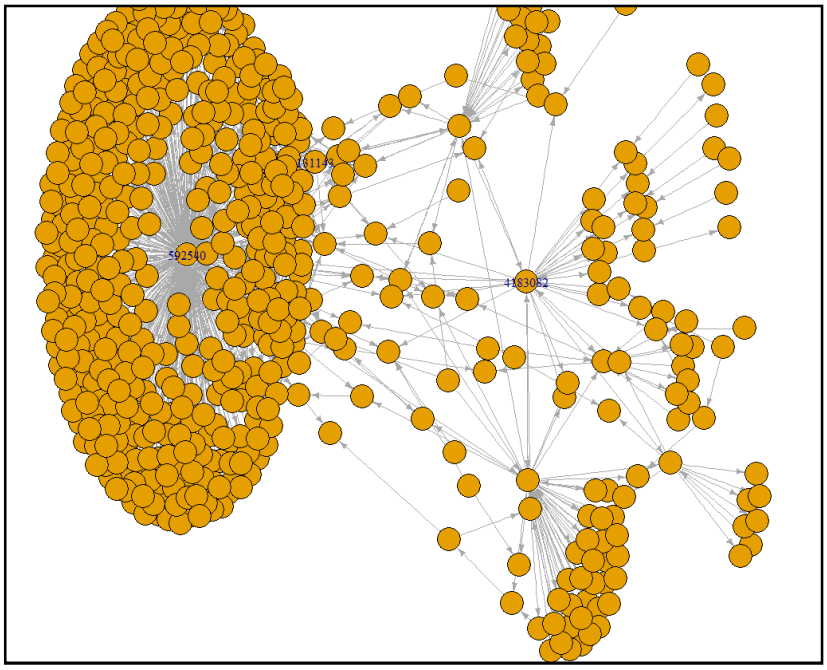
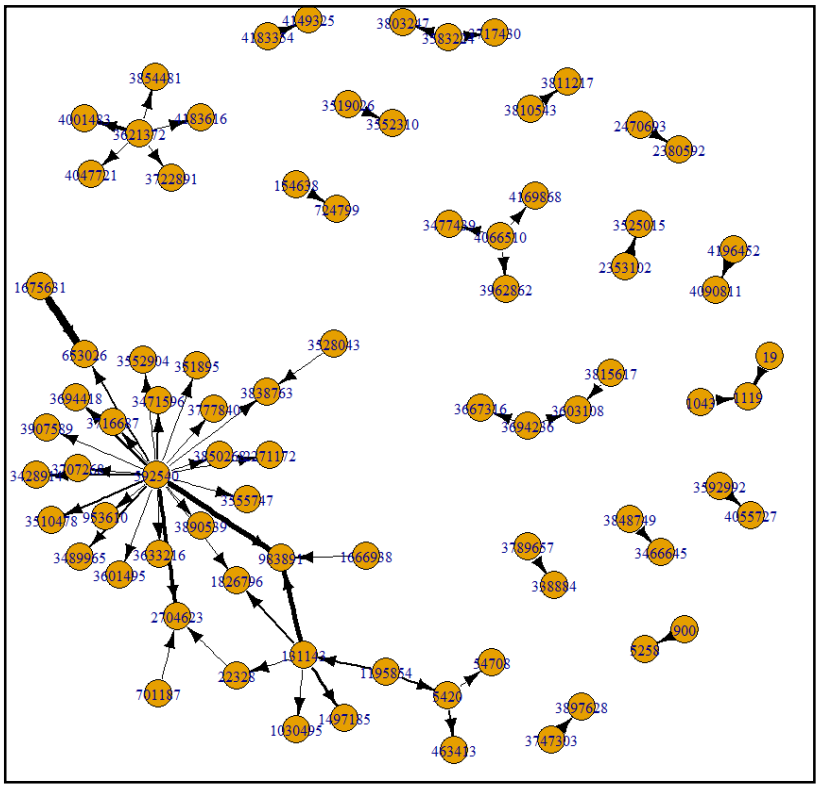


The node 4183082 is interesting because this is a node which links many diverse communities with the largest community formed by the ego network of node 592540.
The graph amply illustrates that 4183082 serves as a focal point for much of the information exchange between the largest cluster in the network and many other clusters.

Fig 4.1. Ego network of order 2 for the node with second highest betweenness centrality 4183082

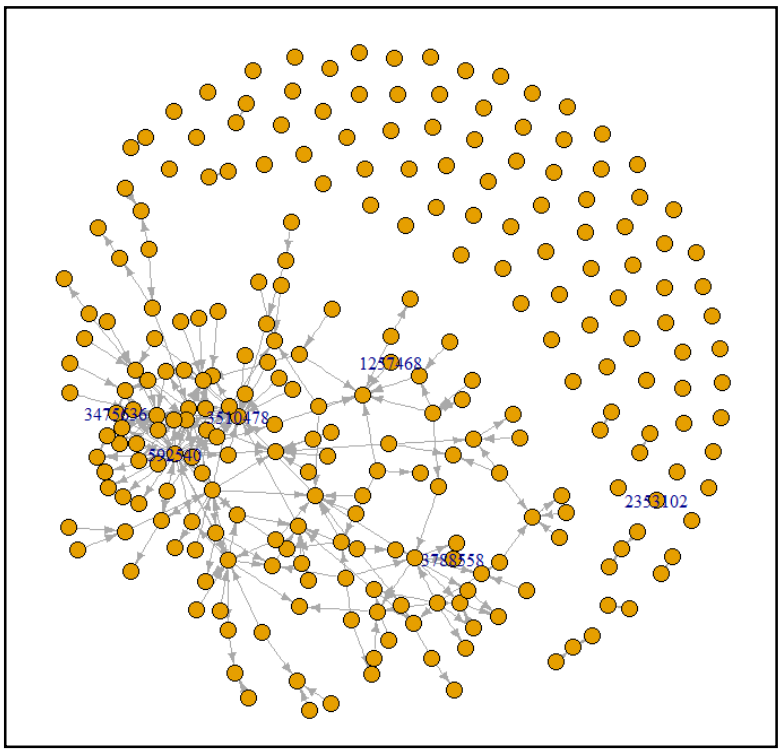
- **WEIGHTS OF EDGES:**



Interestingly, the nodes with the highest degree or the highest centrality masures are not the ones that have exchanged the most information with only some particular nodes. The weights of the edges which represent the level of interaction between two nodes shows that the most interaction infact occurred between a nodes 1675631 and node 653026 which do not have much significance where the centrality of the network is concerned.

Fig. 5: Edges having highest weights and their interconnections

- **NODES WITH HIGHEST DEGREE**



Another interesting feature of this network is that the nodes with highest out degree i.e the ones giving the most answers are very weakly connected. This shows that some knowledgeable people in the SAP online community focus on answering questions concerned to specific communities. The same trend can be seen when we plot a graph of the nodes with the highest indegree.

Fig 6. Connections of nodes with highest out degree

CONCLUSION:

There may be multiple domains of questions within the SAP network. This can be concluded from the fact that many nodes that give out answers are not connected. Similarly, most people in the network are restricted to a specific community and there are close ties between members of that particular community. The presence of a large number of cliques hints to this fact.

The knowledge dissipation between these various domains is primarily governed by weak ties between some individuals who may have knowledge of more than one domain. Such individuals are very few. This explains the existence of a few nodes which have weak ties with other nodes in different communites.

The weakly cohesive structure of this network is a indication of the fact that individuals gain knowledge of various domains through interaction with each other. They may exchange these knowledge with others on the Online Platform leading to the formation of weak ties which are actually the true sources of knowledge.