Final Project Report:

Customer Analysis in the Marketing Strategy of Huawei through social Network Analysis

Guided by:

Prof. Bei Yan

Prepared by:

Harshil Chauhan

Sai Mamilla

Nishanth Fnu

Phani Kumar U

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Introduction

Huawei Technologies Co. Ltd is a multinational company which is headquartered in Shenzhen, China. Huawei is a global leader in information and communications infrastructure and smart products. Huawei is a Chinese producer of telecommunications equipment that specializes in information and communications technologies. Furthermore, the company offers services and consumer products such as wearables, mobile broadband modems, smartphones, tablets, and PCs.

Social media marketing is an efficient approach for companies of all sizes to achieve resolute prospects and consumers. People use social media to seek out, study, follow, and shop from companies. Great social media marketing can propel the company to new heights, cultivating loyal brand champions and even generating leads and revenue.

One of Huawei's major successes is that they market their products on social media. To generate the leads and customer’s Huawei R & D is using social network analysis tools and techniques to identify their prospect people from their social media platform of Instagram which results them to enhance their business positions, social network analysis assists the Huawei Company in improving their business and evaluating the impact of marketing campaigns via better business decisions and the development of a solid strategy. From a network tool they can highlight problems and weaknesses to discover new trends and avoid a brand crisis.

Data Understanding

The information has been obtained through the website "Kaggle". The dataset includes the data from social media of Huawei Instagram communication network with a large number of people that engage activity on a regular basis in social media. The data is preprocessed, and all positive interactions-based links are established as a dataset using Natural Language Processing.

Social media analytics helps identifying the potential customers from the target audience, From the dataset we have chosen Instagram as the source data as currently the engagement rate is comparatively higher and the target node reach index is significantly higher, We have used R software for analysis and Gephi is utilized for visualization tool, this is a network consisting formed of the list of people who have interacted with the Instagram posts and comments.

	A	B	C	D	E	F	G	H	I	J	
1		Charity Sc	Janita The	Heri Sigu	Jamie	Fe Raymo	Alesia Fai	Shavonne	Fahad	Mohamec	Neu
2	Porter Devries	0	0	0	0	0	0	0	1	0	
3	Suzanne Syverson	0	0	0	0	0	0	1	0	0	
4	Ladawn Creason	1	0	0	0	0	0	0	0	0	
5	Mikel Lamberson	0	0	0	0	1	0	0	0	0	
6	Lakendra Lasiter	0	1	0	0	0	0	0	0	0	
7	Kate Shiver	0	0	0	0	0	0	0	0	0	
8	Sharika Aiken	0	0	0	0	0	0	0	0	0	

The Huawei Instagram Communication Network is directed and identified, with 1000 nodes and 9866 edges. Nodes represent People who are interacting with each other. Edges are the connections made on those interactions.

3 .1 Sample and Data collection –

We concentrate on Huawei technology users' mobile phones and clients with a social media connection from Instagram. Customers' social media account demographics, gender, and age have all been considered.

3.2 – Variables

Below are the variables examined in our analysis:

[1]"columns" “data"

[4] "degree.all” “adjacency_matrix"

[7] "degree.out” “diameter” “density” “centrality”

[10] "getMaxWithNodeName" "graph" "instagram.adjacency_matrix"

[16] "node_betweenness”

3.3 Visualizations & Measures –

Node Degree:

As per this directed graph the degree of a node is the number of edges leading into that node and its outdegree, the number of edges leading away from it, our dataset network is labeled as directed networks; hence we distinguish between in-degree and out-degree of a vertex.

```
                    degree.in degree.out
Meredith Stransky           2           2
Brittney Mazzella           0           0
Yi Cook                     0           0
Porter Devries              2           2
Suzanne Syverson            1           1
Ladawn Creason              2           2
[1] "Vertex with max in- and out- links"
       name degree.in degree.out degree.all
    "Neur"          "5"          "5"    "10"
```

Density –

The degree to which nodes are interconnected; for example, lower density networks contain fewer linkages between nodes, and the portion of all links that are really present.

From our analysis we figured out that there is density value of 0.09278438 in this network

Mean Distance –

In a network, the mean path length is the average length of the shortest path between two nodes. As an example, consider how "near" the nodes are to one another, as measured by the average number of steps required to go from one node to another. 3.273137 is the value which was identified in our analysis with the Huawei network.

Diameter :

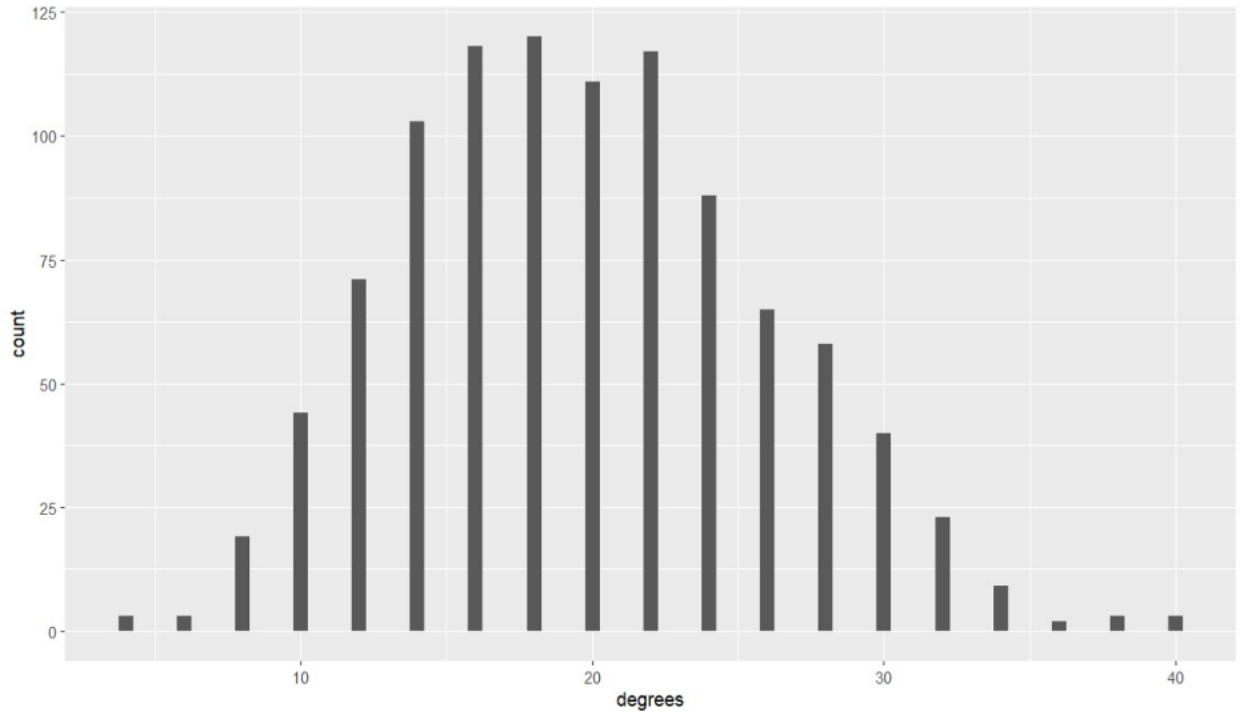
Size of the network where the length of the longest path (in number of edges) between two nodes. We figured out as per the analysis that this network consists of size 6 is the greatest number of steps between any pair of nodes.

Centrality :

Degree Centrality –

The degree of a node during a network is that the number of connections it's to other nodes and also the degree distribution is that the probability distribution of those degrees over the entire network, The graph level centrality index is referred to as centralization, and its value is 0.0395878

The above visualizations define the degree distribution of the network, which shows the network is dense and unequally distributed.



Betweenness Centrality –

The centrality of betweenness describes the average number of unique pathways that travel through the nodes, similar to how central nodes in the network are. It also reveals which nodes are bridges between nodes in the network, which is derived by counting all the shortest paths in the network.

We interpret that Alveena is most central in the network in terms of degree with 240 and centralization of betweenness lies about value of 0.02304013.

Eigenvector Centrality –

The eigenvector centrality reveals how influential a node is in the network, as defined by its network links. It assigns relative scores to all nodes in the network based on the premise that connections to high-scoring nodes contribute more to the node's score than equal connections to low-scoring nodes.

From our analysis we can conclude that most central in the network is Alexis 1 in terms of above centrality with value of 0.9614102.

Closeness Centrality –

Closeness the centrality of a node in a network is determined as the sum of the lengths of the shortest routes between the node and all other nodes in the graph.It computes the distance between a node and the rest of the network's nodes. As a result, the closer a node is to all other nodes, the

more central it is. The most central in the network in terms of degree is Alexis/Alveena - 0.001893939 / 0.001893939 with the value of 0.1412141

Analysis

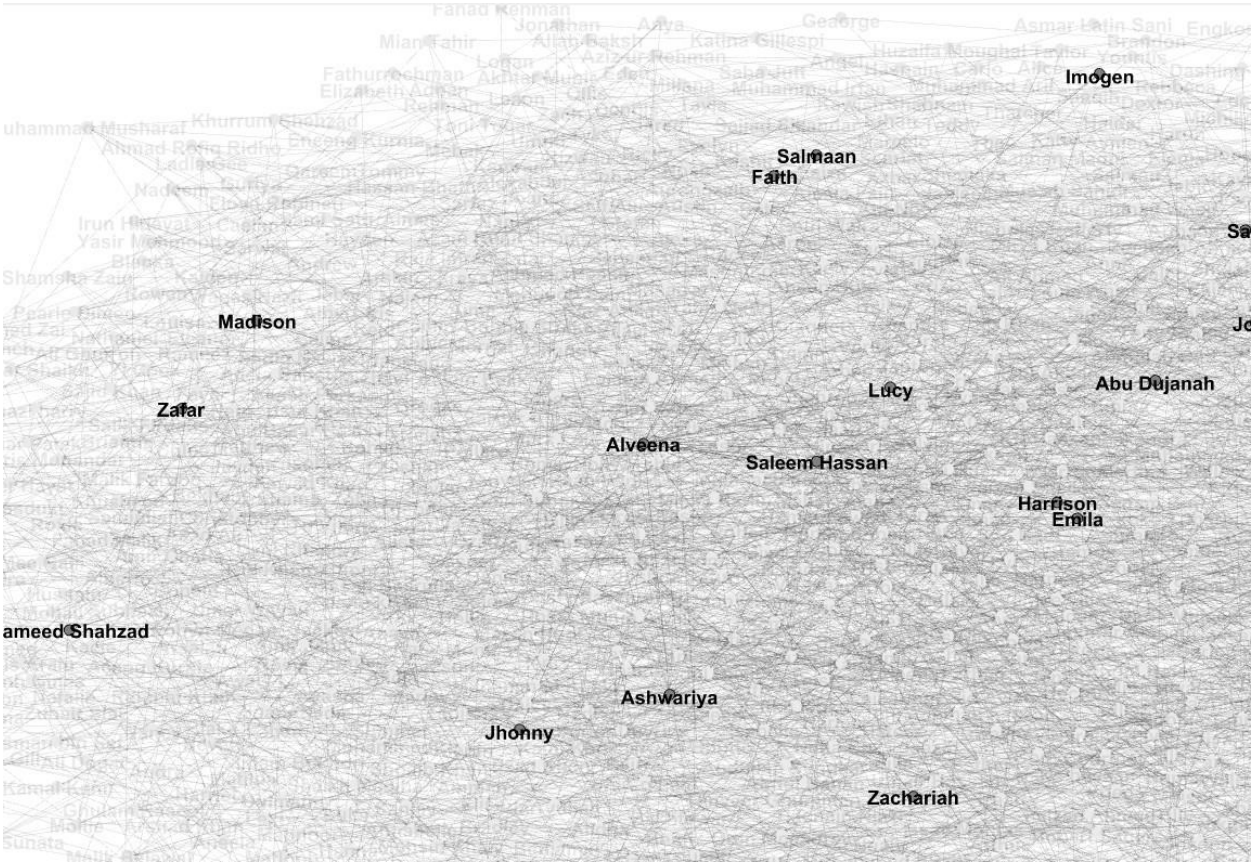
1) Density of the network:

The number of connections a participant has divided by the total number of connections a participant can make is called density.

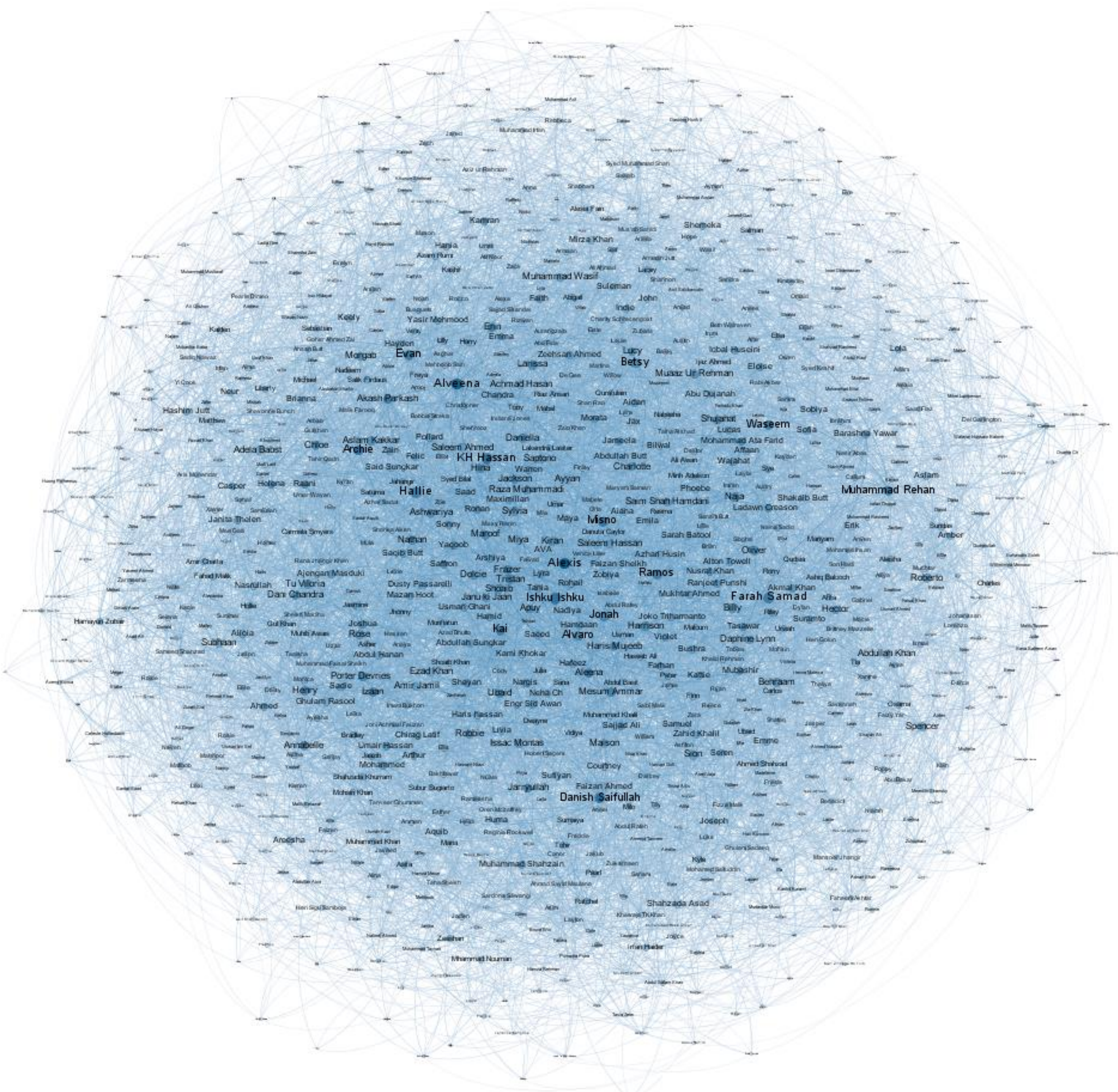
Here the density of the graph object of the network being at **0.0098** indicates that the graph is not too dense.

Simplifying it means the people in the network are not so closely connected meaning hardly communicative with each other.

A graphical representation of the same:



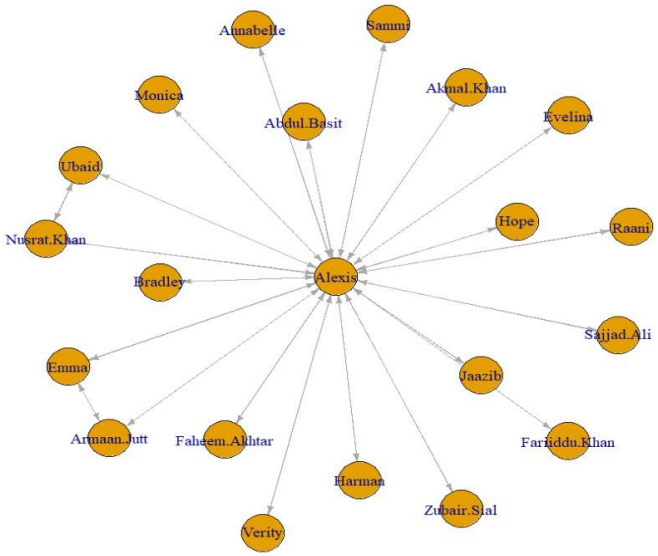
Our Network looks like:



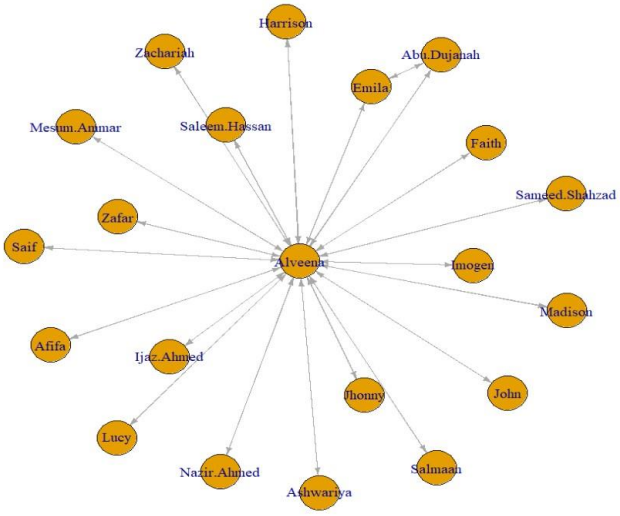
- **Maximum degree** of all the nodes is **40**. Those people are **Alexis, Ishku and Alveena**. This shows the maximum num of people connected with each other.
- **Network closeness** with low value **0.0405** explains the sparse network as well.
- As we can see the graph is quite sparse with **Alexis** in the center.
- **Eigenvector centrality** of **Alexis** is **1** which explains it being in the central of the network.

Ego Networks

Alexis



Alveena



- Potential target people for the **target advertisements** can be from this ego network of **Alexis** and **Alveena**
- Alexis has more hold over its ego network compared to Alveena as the eigenvector of Alexis is higher which makes him the most influential of all.

Results and Recommendations

We wanted to target the people with great reach and the people who have a high standing in their social circles. So we decided to target ads to the most Influential people and people who have big Social circles.

People with high eigenvector centrality, maximum betweenness centrality have the conditions met. So we evaluated these metrics and found the examples of Alexis and Alveena. Alexis has the highest Eigenvector centrality (1) in the network. And Alveena has the highest betweenness in the network with the value of 8773.909.

Targeted ADs can be run to similar people whose reach is so great that others buy products being influenced by them. This reduces the *cost of adverts/amount in sales* significantly.

Based on the List of people with high Eigen-vector and High Degree centrality, The Demography of the Influencers can be Identified to target them Specifically. Understanding The Demography can be used for curated content creation on the official social media handles to improve organic growth.

The data can be further improved to get more accurate results.

- Including weights in the dataset to understand the connections more accurately
- Including negative interactions from the social media platforms to avoid potential outliers.