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K-Dramas in Google: A NetMiner Analysis

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Abstract

The ultimate goal of this paper is to analyze 41 articles of Google regarding K-dramas. As a research tool for our goal, we used the software package NetMiner. To begin with, this paper provides network properties such as the number of links, average degree, components (weak and strong), inclusiveness, reciprocity (Arc and Dyad), transitivity, clustering coefficient, a mean distance, and a diameter of nodes. Also, this paper argues that topic 4 was the most widely used one in 41 articles of Google, followed by topic 9, topic 1, and topic 12, in that order. The so-called soft clustering indicates that one node can belong to several clusters. It can be sub-classified into cliques, n-cliques, k-plex, and k-core. This paper provides the structural properties of cliques, n-cliques, k-plex, and k-core. The term clique means that all nodes in a group must be directly linked together. On the other hand, the term n-clique refers to two-stage links. If links take place within three nodes (two stages), then they belong to the same group. Similarly, the term k-plex indicates that when the number of nodes in a group is n and every node in the group is linked together more than n-k, the group is called a cohesive group. Finally, the term k-core refers to a set of nodes associated with more than k. The value of k was fixed as 3 in NetMiner. Thus, the software package NetMiner permits 3 cores only. This paper clearly shows which words belong to cliques, n-cliques, k-plex, and k-core, respectively.

Keywords: K-drama, NetMiner, google, clique, n-clique, k-plex, k-core

INTRODUCTION

The main goal of this paper is to analyze 41 articles written from 21st 12, 2022 to 6th, 2, 2023 regarding K-dramas in Google. As a theoretical tool for this goal, we used the software package NetMiner developed by Cyram. First, we provide information on the number and proportion of common nouns and proper nouns. Second, we provide network properties such as the number of links, average degree, components (weak and strong), inclusiveness, reciprocity (Arc and Dyad), transitivity, clustering coefficient, a mean distance, and a diameter of nodes. Third, we aim to consider 13 topics and their keywords and provide information on the frequency of each topic. Fourth, we provide information on the number of cliques, their members, cohesion indices, and their map. Fifth, we provide information on the number, size, members, and cohesion index of N-cliques and their map. Sixth, we provide information on the number, size, members, density, and cohesion index of k-plex including its map. Finally, we provide structural properties such as the core index of k-core, the number of nodes and components, and its map.

RESULTS

Structural and Descriptive Properties of Data

In what follows, we aim at providing the structural and descriptive properties of data analyzed by NetMiner. Table 1 shows the number of common nouns and proper nouns and their proportion:

Table 1 Tagging

Value	Frequency	Proportion	Cumulative Proportion
Common Noun	2150	0.585	0.585
Proper Noun	1525	0.415	1
Total	3675	1	

It is interesting to note that the overall frequency of common nouns and proper nouns are 3,675 tokens. More specifically, the number of common nouns occurred in 41 articles of Google is 2,150 and their proportion and cumulative proportion are 0.585, respectively. On the other hand, the number of proper nouns is 1,525 and their proportion is 0.415. As can be seen from Table 1, 3,675 nouns occurred in 41 articles of Google regarding K-dramas.

Now let us turn our attention to the network properties of our data analyzed by NetMiner:

Table 2 Network properties

	# Of Links: O(m)	Density: O(m)	Average Degree: O(m)	# Of Components (Weak): O(m)	# Of Components (Strong): O(m)
Word Network (Sentences)	4,761	0	1.505	145	1,939

It is probably worthwhile pointing out that as indicated in Table 2, the number of links is 4,761 and that average degree is 1.505. The term degree refers to local centrality. In other words, it refers to the number of directly linked neighbors. More interestingly, the number of components (weak) is 145, whereas the number of components (strong) is 1,939. The term weak component means that there is a link between two nodes. The term strong component means that A gives a link to B and A receives a link from B. Simply put, strong components take place in two directions. As illustrated in Table 2, the number of components (strong) is thirteen times higher than that of components (weak).

Now attention is also paid to the network properties of data analyzed by NetMiner:

Table 3 Network properties

	Inclusiveness: O(m)	Reciprocity (Arc): O(m)	Reciprocity (Dyad): O(m)	Transitivity: O(nm)
Word Network (Sentences)	1	0.024	0.012	0.012

It is interesting to consider inclusiveness. The term inclusiveness refers to the proportion of linked nodes. In these data, the proportion of the linked nodes is 100%, which in turn indicates that there are no isolated links. On the other hand, the term reciprocity (Arc) refers to the proportion of links linked in two directions, whereas the term reciprocity (Dyad) refers to the proportion of node pairs linked in two directions. As illustrated in Table 3, the proportion of reciprocity (Arc) is 0.024, whereas that of reciprocity (Dyad) is 0.012. Note that reciprocity (Dyad) is preferred over reciprocity (Arc) when we measure the proportion of mutual links. Finally, the term transitivity refers to a relationship among three nodes. If A gives a link to B and B gives a link to C, then A gives a link to C. As exemplified in Table 3, the proportion of transitivity is 0.012 (1.2%).

Now let us turn our attention to the other network properties:

Table 4 Network properties

	Clustering Coefficient: O(n^3)	Mean Distance: O(nm)	Diameter: O(nm)	Node Connectivity: O(n^2*m)	Link Connectivity: O(n^2*m)
Word Network (Sentences)	0.034	6.765	21	0	0

The term clustering coefficient refers to the probability value of neighboring nodes associated with a node. As indicated in Table 4, the proportion value of neighboring nodes linked to a node is 0.034. Notice that the mean distance called Average Path Length is 6.765. Finally, the term diameter refers to the distance between two nodes that are the furthest. This index tells us about the size of the inner network.

Topic Info

In what follows, we aim to look into 13 topics and keywords consisting of them. Table 5 shows information on 13 topics and major keywords that are made up of 41 articles of Google:

Table 5 Topic info

	1st Keyword	2nd Keyword	3rd Keyword	4th Keyword	5th Keyword
Topic-1	story	woman	show	man	country
Topic-2	series	song	scene	thriller	OST
Topic-3	Park	drama	family	viewer	time
Topic-4	drama	life	popularity	love	TV
Topic-5	dramas	way	Woo	time	zombie
Topic-6	character	show	country	time	romance
Topic-7	dramas	romance	way	love	subtitle
Topic-8	fan	Game	Netflix	Squid	idol
Topic-9	Kdramas	episode	TV	content	movie
Topic-10	Korean	Kdrama	plot	family	beauty
Topic-11	child	company	year	age	girl
Topic-12	person	language	show	culture	subtitle
Topic-13	series	world	dramas	drama	year

It is probably worthwhile pointing out that topic 2 includes the keywords *series*, *song*, *scene*, *thriller*, and *OST*. As illustrated in Table 5, the word *series* are the first keyword, which is deemed to be the most frequently used one in topic 2. It is important to mention, on the other hand, that topic 4 includes the keywords *drama*, *life*, *popularity*, *love*, and *TV*. It is interesting consider topic 9. When it comes to topic 9, it contains the keywords *K-dramas*, *episode*, *TV*, *content*, and *movie*. In this topic, the first keyword is *K-dramas*, which in turn indicates that it was the most widely used one in topic 9. It is particularly noteworthy that the keywords *person*, *language*, *show*, *culture*, and *subtitle* consist of topic 12.

Now let us turn to the frequency of each topic:

Topic 6 Frequency of each topic

	# of sentences
Topic-1	159
Topic-2	95
Topic-3	98
Topic-4	174
Topic-5	99
Topic-6	93
Topic-7	126
Topic-8	152
Topic-9	165
Topic-10	151
Topic-11	97
Topic-12	155
Topic-13	115

It is interesting to observe topic 4. As can be seen from Table 6, topic 4 occurred 174 times (the highest). As observed earlier, the keywords *drama*, *life*, *popularity*, *love*, and *TV* constitute topic 4. It is worth pointing out, on the other hand, that topic 9 appeared 165 times in 41 articles of Google (the second highest). It must also be stressed that topic 1 occurred 159 times (the third highest). As shown in Table 5, the keywords *story*, *woman*, *show*, *man*, and *country* consist of topic 1. It must also be emphasized that topic 12 appeared 155 times in 41 articles of Google (the fourth highest). It seems thus reasonable to conclude that topic 4 was the most widely used one in 41 articles of Google, followed by topic 9, topic 1, and topic 12, in that order.

SOFT CLUSTERING

In the following, we aim to investigate the properties of soft clustering. Clustering is classified into two types, namely hard clustering and soft clustering. The term hard clustering indicates that one node can belong to one cluster. On the other hand, the term soft clustering indicates that one node can belong to several clusters. The so-called soft clustering can be sub-classified into cliques, n-cliques, k-plex, and k-core, etc. We look into these sub-types of soft clustering.

Cliques

The term clique means that all nodes in a group must be directly linked together. Somewhat looser ones such as n-cliques, k-pleax, and k-core are much used since the criteria for cliques are so severe. When it comes to cliques, there is no direction and weight of links. Table 7 shows the number of cliques and their members:

Table 7 Number of cliques and their members

CLIQUES	MEMBERS
Clique1	drama,series,film,Netflix
Clique2	drama,series,film,television
Clique3	drama,series,South Korea,television
Clique4	drama,series,Squid,fan
Clique5	drama,series,action
Clique6	drama,series,time
Clique7	drama,episode,scene
Clique8	drama,lead,romance
Clique9	drama,popularity,film
Clique10	drama,romance,action
Clique11	drama,scene,action
Clique12	drama,scene,Netflix
Clique13	drama,scene,Korean
Clique14	drama,scene,time
Clique15	drama,Korean,subtitle
Clique16	drama,Korean,television
Clique17	drama,woman,fan
Clique18	drama,woman,South Korea
Clique19	drama,year,Netflix
Clique20	Kdrama,Korean,story
Clique21	Kdrama,Korean,thing
Clique22	Kdrama,Netflix,content
Clique23	Kdrama,Squid,fan
Clique24	Kdrama,audience,character
Clique25	Kdrama,audience,time
Clique26	Kdrama,character,story
Clique27	Kdrama,content,fan
Clique28	Kdramas,dramas,Netflix
Clique29	Kdramas,dramas,genre
Clique30	Kdramas,dramas,movie
Clique31	Kdramas,dramas,time

Clique32	Kdramas,dramas,woman
Clique33	Kdramas,fan,woman
Clique34	Kdramas,story,woman
Clique35	Korea,movie,dramas,TV
Clique36	Korea,movie,success
Clique37	TV,series,show,movie
Clique38	TV,series,show,Netflix
Clique39	TV,series,show,time
Clique40	TV,series,film,Netflix
Clique41	TV,series,thriller,movie
Clique42	TV,content,industry
Clique43	TV,content,Netflix
Clique44	TV,dramas,time
Clique45	TV,dramas,Netflix
Clique46	TV,industry,film
Clique47	TV,language,show
Clique48	audience,person,world
Clique49	audience,person,year
Clique50	character,woman,dramas
Clique51	character,woman,story
Clique52	child,girl,series
Clique53	company,South Korea,production
Clique54	company,Netflix,content
Clique55	content,world,fan
Clique56	country,South Korea,production
Clique57	country,movie,world
Clique58	Game,Squid,fan
Clique59	dramas,television,movie
Clique60	dramas,television,Korean
Clique61	dramas,action,genre
Clique62	dramas,life,woman
Clique63	family,student,year
Clique64	genre,action,romance

Clique65	genre,action,series
Clique66	genre,show,series
Clique67	genre,show,romance
Clique68	girl,story,series
Clique69	girl,story,woman
Clique70	language,show,lot
Clique71	language,show,subtitle
Clique72	life,story,way
Clique73	life,story,woman
Clique74	lot,show,romance
Clique75	lot,show,scene
Clique76	man,story,woman
Clique77	movie,series,television,show
Clique78	person,story,way
Clique79	person,story,world
Clique80	plot,Korean,scene
Clique81	production,South Korea,television
Clique82	show,series,fan
Clique83	show,scene,Netflix
Clique84	show,scene,time
Clique85	song,action,series
Clique86	story,action,series
Clique87	thriller,action,series
Clique88	thriller,action,romance

A clique means that some nodes are to close ranks. For instance, there may be several groups in a high school. Note that the high school consists of a network. A group of female students might name their group as a seven princess group. Just like that, the members of a clique close ranks. Note that many cliques in a network can occur. As exemplified in Table 8, 88 cliques occurred in 40 articles of Google. It is significant to note that in clique 1, the words *drama*, *series*, *film*, and *Netflix* close ranks. That is to say, some close words form a group by linking them. It should also pointed out that in clique 7, the close words *drama*, *episode*, and *scene* occurred in the entire network. Quite interestingly, in clique 40, the words *TV*, *series*, *film*, and *Netflix* close ranks. Finally, it should also be noted that in clique 88, the three words *thriller*, *action*, and *romance* occurred in the entire network and they form a group by linking them together.

Now attention is paid to subgroup details:

Table 8 Subgroup details

CLIQUES	SIZE	COHESION INDEX
Clique1	4	5.362
Clique2	4	6.146
Clique3	4	6
Clique4	4	5.727
Clique5	3	4.8
Clique6	3	4.683
Clique7	3	7.385
Clique8	3	8
Clique9	3	8.348
Clique10	3	6.4
Clique11	3	6.194
Clique12	3	5.189
Clique13	3	6.194
Clique14	3	6
Clique15	3	7.385
Clique16	3	6.194
Clique17	3	5.486
Clique18	3	6.194
Clique19	3	5.647
Clique20	3	6.194
Clique21	3	10.105
Clique22	3	6.621
Clique23	3	7.68
Clique24	3	8.727
Clique25	3	8.348
Clique26	3	6.194
Clique27	3	7.385
Clique28	3	5.647
Clique29	3	6.621
Clique30	3	6.194
Clique31	3	6.621
Clique32	3	6.621
Clique33	3	7.111
Clique34	3	6.194
Clique35	4	7.2
Clique36	3	9.143
Clique37	4	5.478
Clique38	4	5.143
Clique39	4	5.727
Clique40	4	6.146
Clique41	4	6.632

Clique42	3	9.6
Clique43	3	6.4
Clique44	3	6.194
Clique45	3	5.333
Clique46	3	10.105
Clique47	3	7.111
Clique48	3	13.714
Clique49	3	14.769
Clique50	3	7.111
Clique51	3	6.621
Clique52	3	9.6
Clique53	3	14.769
Clique54	3	8.727
Clique55	3	9.143
Clique56	3	14.769
Clique57	3	10.667
Clique58	3	11.294
Clique59	3	6.621
Clique60	3	7.385
Clique61	3	7.111
Clique62	3	8.348
Clique63	3	32
Clique64	3	9.143
Clique65	3	6.194
Clique66	3	5.189
Clique67	3	7.111
Clique68	3	6
Clique69	3	8
Clique70	3	9.143
Clique71	3	10.667
Clique72	3	9.143
Clique73	3	7.68
Clique74	3	8
Clique75	3	7.68
Clique76	3	8.348
Clique77	4	6
Clique78	3	8.727
Clique79	3	8.348
Clique80	3	12.8
Clique81	3	11.294
Clique82	3	4.923
Clique83	3	5.818
Clique84	3	6.857
Clique85	3	8.348
Clique86	3	5.189

Clique87	3	6.857
Clique88	3	10.667

Notice that the term size in Table 8 refers to the number of nodes. Furthermore, notice that the cohesion index means inner link density divided into outer link density. Simply put, the so-called cohesion index refers to cohesive groups. Note that the node number of clique 1 is 4 and its cohesion index is 5.362. If the cohesion index is larger than 1, then it means that inner link density is larger than outer link density. Quite interestingly, the node number of clique 40 is 4 and its cohesion index is 6.146. Finally, it is also interesting to consider clique 88. The node number of clique 88 is 3 and the cohesion index is 10.667, thereby indicating that inner link density is by far larger than outer link density.

Now let us turn our attention to the map of cliques. We cut off many nodes for the reason of space and included core nodes in the map:

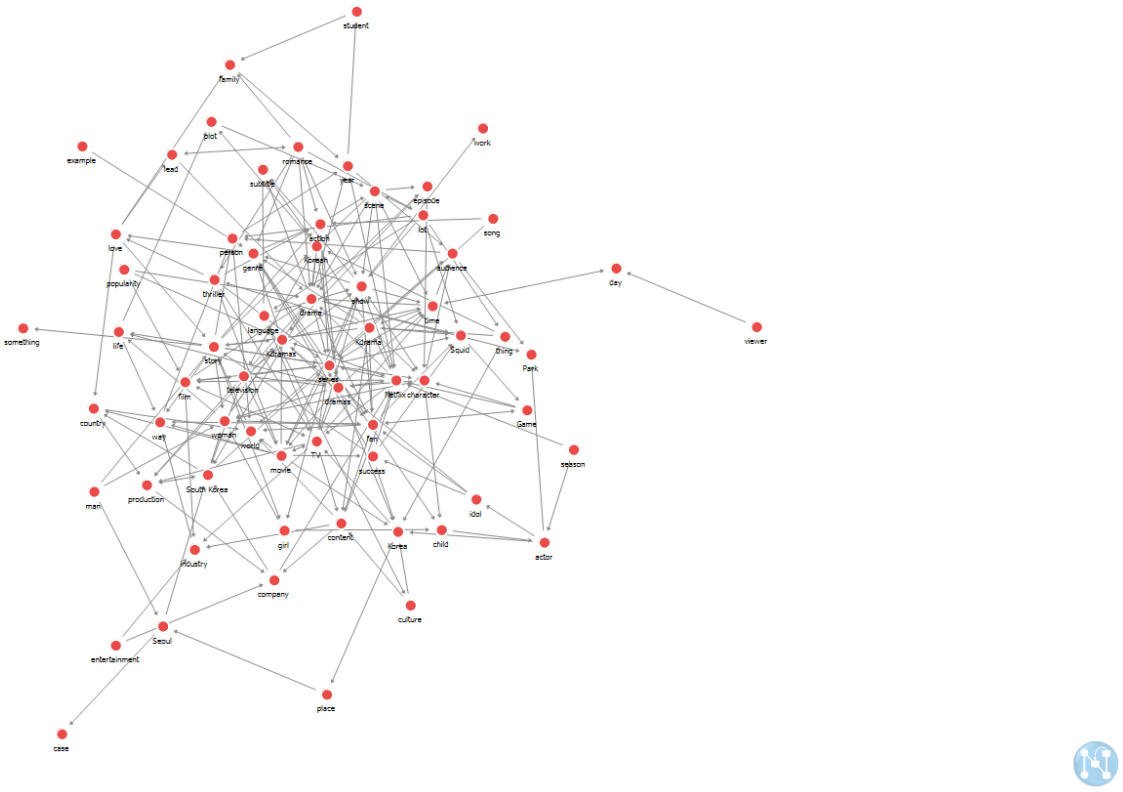


Figure 1 Map of cliques

Note that as indicated in Figure 1, the four words *drama*, *series*, *film*, and *Netflix* consist of clique 1 and that they close ranks. They form a group by linking them together, hence resulting in clique 1. It is interesting to observe clique 7. The three words *drama*, *episode*, and *scene* constitute clique 7. They link themselves completely and close ranks. It is probably worthwhile noting that as can be seen from figure 1, the four words *TV*, *series*, *film*, and *Netflix* are made up

of clique 40. They close ranks by linking themselves. Notice that the entire network included 88 cliques and thus we couldn't include all of them in the map.

N-Cliques

In what follows, we aim at inquiring into the structural properties of n-cliques. N-cliques are the ones that are somewhat looser than cliques. The term n-clique refers to two-stage links. If links take place within three nodes (two stages), then they belong to the same group. Notice, to begin with, that the number of n-cliques occurred in 41 articles of Google is 834, which are even larger than that of cliques. This takes place since n-cliques are the ones that are looser than cliques. Our list was cut off in n-clique 20 for convenience:

Table 9 N-cliques

N-CLIQUES	MEMBERS
n-Clique1	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,Kdrama,scene ,romance,action,television
n-Clique2	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,Kdrama,scene ,content,audience
n-Clique3	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,Kdrama,idol ,action,television
n-Clique4	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,Kdrama,idol ,content
n-Clique5	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,Kdrama,girl ,action,television
n-Clique6	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,South Korea ,scene,romance,action,television
n-Clique7	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,South Korea ,scene,content

n-Clique8	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,character,South Korea ,girl,action,television
n-Clique9	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,television,action ,romance,scene,Kdrama
n-Clique10	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,television,action ,romance,scene,South Korea
n-Clique11	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,television,action ,girl,Kdrama
n-Clique12	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,television,action ,girl,South Korea
n-Clique13	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,television,production ,South Korea
n-Clique14	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,content,scene,Kdrama
n-Clique15	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,content,scene,South Korea
n-Clique16	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,show,film,content,production ,South Korea
n-Clique17	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,life,character,action,television ,Kdrama,scene
n-Clique18	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas

	,woman,life,character,action,television ,Kdrama,girl
n-Clique19	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,life,character,action,television ,Kdrama,idol
n-Clique20	drama,series,fan,Netflix,TV,dramas ,movie,story,time,genre,Korean,Kdramas ,woman,life,character,action,television ,South Korea,girl

Perhaps it is worthwhile pointing out that n-clique 1 includes the words *drama*, *series*, *fan*, *genre*, *Korean*, *K-dramas*, *woman*, *show*, *character*, *K-drama*, *scene*, *romance*, *action*, and *television*. These words occur within three nodes (within two stages) and thus they belong to the same group. Simply put, the max distance is 2. It is important to note that n-clique 10 contains the words *drama*, *series*, *fan*, *Netflix*, *TV*, *dramas*, *movie*, *story*, *time*, *genre*, *Korean*, *K-dramas*, *woman*, *show*, *film*, *television*, *action*, *romance*, *scene*, and *South Korea*. These words appear within two stages (within 3 nodes) and they belong to the same group by linking them.

Now let us turn to subgroup details. Our list was cut off in n-clique 100 (734 more n-cliques were omitted for the reason of space):

Table 10 Subgroup details

N-CLIQUES	SIZE	DENSITY	COHESION INDEX
n-Clique1	20	0.384	3.842
n-Clique2	19	0.374	3.38
n-Clique3	19	0.38	3.574
n-Clique4	18	0.379	3.31
n-Clique5	19	0.386	3.705
n-Clique6	20	0.368	3.607
n-Clique7	18	0.366	3.046
n-Clique8	19	0.368	3.464
n-Clique9	20	0.384	3.926
n-Clique10	20	0.374	3.818
n-Clique11	19	0.386	3.785
n-Clique12	19	0.374	3.67
n-Clique13	18	0.392	3.68
n-Clique14	18	0.392	3.459
n-Clique15	18	0.366	3.104
n-Clique16	18	0.353	2.965
n-Clique17	19	0.363	3.374
n-Clique18	19	0.351	3.299

n-Clique19	19	0.345	3.178
n-Clique20	19	0.333	3.071
n-Clique21	19	0.345	3.147
n-Clique22	20	0.337	3.368
n-Clique23	18	0.359	3.446
n-Clique24	20	0.384	3.969
n-Clique25	19	0.363	3.242
n-Clique26	20	0.358	3.468
n-Clique27	18	0.34	2.701
n-Clique28	19	0.374	3.556
n-Clique29	19	0.345	3.085
n-Clique30	18	0.333	2.722
n-Clique31	18	0.373	3.388
n-Clique32	20	0.389	4.208
n-Clique33	20	0.368	3.806
n-Clique34	18	0.386	3.436
n-Clique35	18	0.346	2.855
n-Clique36	19	0.38	3.768
n-Clique37	19	0.357	3.389
n-Clique38	20	0.358	3.541
n-Clique39	20	0.358	3.468
n-Clique40	20	0.347	3.437
n-Clique41	20	0.342	3.248
n-Clique42	20	0.3	2.792
n-Clique43	19	0.316	3
n-Clique44	18	0.353	3.209
n-Clique45	18	0.333	2.882
n-Clique46	18	0.353	3.144
n-Clique47	18	0.359	3.303
n-Clique48	18	0.359	3.203
n-Clique49	18	0.359	3.235
n-Clique50	18	0.366	3.261
n-Clique51	18	0.353	3.022
n-Clique52	16	0.367	2.85
n-Clique53	16	0.375	2.887
n-Clique54	19	0.351	3.441
n-Clique55	15	0.381	3.032
n-Clique56	14	0.352	2.747
n-Clique57	15	0.41	3.259
n-Clique58	14	0.341	2.407
n-Clique59	15	0.352	2.643
n-Clique60	15	0.381	2.857
n-Clique61	15	0.352	2.669
n-Clique62	15	0.343	2.547
n-Clique63	15	0.4	3.152

n-Clique64	15	0.39	3.016
n-Clique65	19	0.363	3.307
n-Clique66	18	0.373	3.286
n-Clique67	18	0.386	3.436
n-Clique68	19	0.368	3.429
n-Clique69	19	0.357	3.286
n-Clique70	18	0.373	3.286
n-Clique71	19	0.333	3.04
n-Clique72	19	0.339	3.156
n-Clique73	19	0.333	2.951
n-Clique74	19	0.357	3.32
n-Clique75	19	0.327	3.048
n-Clique76	17	0.346	2.695
n-Clique77	17	0.375	3.065
n-Clique78	17	0.375	3.22
n-Clique79	17	0.397	3.516
n-Clique80	17	0.368	3.034
n-Clique81	17	0.346	2.771
n-Clique82	20	0.363	3.448
n-Clique83	19	0.368	3.429
n-Clique84	19	0.368	3.429
n-Clique85	20	0.363	3.556
n-Clique86	19	0.357	3.286
n-Clique87	20	0.368	3.764
n-Clique88	20	0.363	3.519
n-Clique89	19	0.363	3.481
n-Clique90	19	0.368	3.5
n-Clique91	18	0.359	3.049
n-Clique92	18	0.366	3.075
n-Clique93	18	0.359	2.991
n-Clique94	18	0.373	3.129
n-Clique95	18	0.366	3.165
n-Clique96	19	0.345	3.116
n-Clique97	19	0.339	3.156
n-Clique98	19	0.339	3.156
n-Clique99	19	0.345	3.055
n-Clique100	19	0.345	3.055
	... 734 more	... 734 more	... 734 more

It is worth observing that the size of n-clique 1 is 20 (20 nodes) and the cohesion index of n-clique 1is 3.842. As can be seen from Table 10, the size of n-clique 40 is also 20 nodes and its cohesion index is 3.487.

Now let us consider the map of n-cliques:

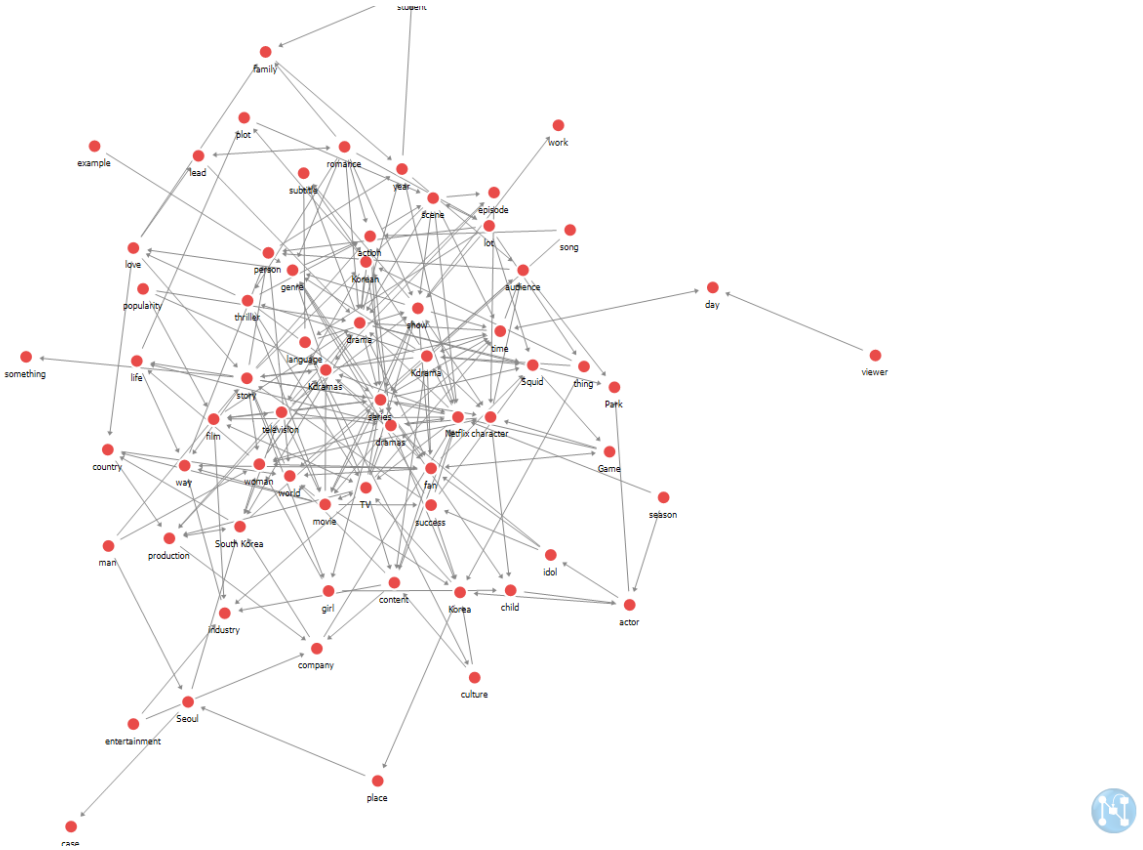


Figure 2 Map of n-cliques

The members of an n-clique belong to the same group when the max distance is 2. That is to say, they form a group by linking them within 3 nodes (two stages). As exemplified in Figure 2, the words *series*, *drama*, *action*, *genre*, *TV*, *fan*, *child*, *show*, *scene*, etc. belong to the same group (an n-clique). These words occur within two stages (within 3 nodes). The max distance among them is 2. It is worth pointing out, on the other hand, that the words *television*, *story*, *thriller*, *K-dramas*, *squid*, *Netflix*, etc. belong to the same group by linking them within two stages. Again, we cut off many nodes for the reason of space and included core nodes only.

K-Plex

This section centers on investigating the structural properties of k-plex. The term k-plex is somewhat looser than the term clique. As observed earlier, cliques indicate that if all nodes in a group are linked together, then the nodes linked together belong to the same group. On the other hand, the term k-plex indicates that when the number of nodes in a group is n and every node in the group is linked together more than n-k, the group is called a cohesive group. Here n refers to the number of nodes in a group and the value of k is decided by a researcher. The value of k was fixed as 2 in NetMiner. If the number of nodes in a group is 4, then the k-plex index is 2 since k is 2. Accordingly, if more than two nodes in a group are linked together, the group is called the cohesive group. It is worth noting that the total number of k-plex analyzed by NetMiner is 579. Our list was cut off in k-plex 20 for the reason of space:

Table 11 Members of k-plex

K-PLEX	MEMBERS
k-Plex1	world,year,person,audience
k-Plex2	year,drama,family,romance
k-Plex3	year,drama,time,audience
k-Plex4	series,year,Netflix,drama
k-Plex5	year,Netflix,drama,scene
k-Plex6	year,Netflix,drama,film
k-Plex7	year,drama,Park,audience
k-Plex8	Kdrama,year,Netflix,audience
k-Plex9	world,story,fan,woman
k-Plex10	world,story,person,way
k-Plex11	world,story,movie,way
k-Plex12	world,story,fan,way
k-Plex13	world,story,success,movie
k-Plex14	world,series,story,movie
k-Plex15	world,series,story,fan
k-Plex16	world,story,person,audience
k-Plex17	world,Kdramas,story,movie
k-Plex18	world,country,story,love
k-Plex19	world,Kdramas,story,fan
k-Plex20	world,Kdrama,story,fan

Perhaps it is worthwhile saying that the words *world*, *year*, *person*, and *audience* belong to the same cohesive group (k-plex 1). I think it should also be pointed out that k-plex 14 includes the words *world*, *series*, *story*, and *movie*. It is interesting to observe k-plex 20. When it comes to k-plex 20, the words *world*, *K-drama*, *story*, and *fan* form a cohesive group, as illustrated in Table 11.

Now attention is paid to subgroup details:

Table 12 Subgroup details

K-PLEX	SIZE	DENSITY	COHESION INDEX
k-Plex1	4	0.833	13.125
k-Plex2	4	0.667	5.793
k-Plex3	4	0.667	4.941
k-Plex4	4	0.833	4.375
k-Plex5	4	0.833	5.385
k-Plex6	4	0.833	5.676
k-Plex7	4	0.667	6.222
k-Plex8	4	0.667	5.25
k-Plex9	4	0.667	4.541
k-Plex10	4	0.833	8.4
k-Plex11	4	0.667	5.091
k-Plex12	4	0.667	5.091
k-Plex13	4	0.667	4.941
k-Plex14	4	0.667	3.733
k-Plex15	4	0.667	3.733
k-Plex16	4	0.833	8.077
k-Plex17	4	0.667	4.421
k-Plex18	4	0.667	6.462
k-Plex19	4	0.667	4.421
k-Plex20	4	0.667	4.308
k-Plex21	4	0.667	4.8
k-Plex22	4	0.667	5.419
k-Plex23	4	0.667	4.941
k-Plex24	4	0.667	7.304
k-Plex25	4	0.667	7.304
k-Plex26	4	0.667	5.793
k-Plex27	4	0.667	4.421
k-Plex28	4	0.667	4.098
k-Plex29	4	0.667	4.941
k-Plex30	4	0.667	5.25
k-Plex31	4	0.833	7.241
k-Plex32	4	0.667	5.6
k-Plex33	4	0.667	6.462
k-Plex34	4	0.833	7.778
k-Plex35	4	0.667	4.667
k-Plex36	4	0.833	5.526
k-Plex37	4	0.667	3.5
k-Plex38	4	0.667	3.055
k-Plex39	4	0.667	3.818
k-Plex40	4	0.833	8.75
k-Plex41	4	0.833	9.13
k-Plex42	4	0.833	7.5

k-Plex43	4	0.833	7
k-Plex44	4	0.833	8.4
k-Plex45	5	0.8	6.526
k-Plex46	5	0.8	6.2
k-Plex47	4	0.833	7.241
k-Plex48	4	0.833	6.774
k-Plex49	4	0.833	5.385
k-Plex50	4	0.667	4
k-Plex51	5	0.8	5.636
k-Plex52	4	0.667	4.098
k-Plex53	4	0.667	4.098
k-Plex54	4	0.667	3.652
k-Plex55	4	0.667	3.652
k-Plex56	4	0.833	5.676
k-Plex57	4	0.667	9.882
k-Plex58	4	0.667	6.72
k-Plex59	4	0.667	4.667
k-Plex60	4	0.667	3.907
k-Plex61	4	0.667	5.25
k-Plex62	4	0.667	8.842
k-Plex63	4	0.667	4.421
k-Plex64	5	0.8	4.863
k-Plex65	4	0.667	5.25
k-Plex66	4	0.833	5.676
k-Plex67	4	0.833	5.526
k-Plex68	4	0.833	5
k-Plex69	4	0.667	4.8
k-Plex70	4	0.667	6.222
k-Plex71	4	0.667	3.733
k-Plex72	4	0.833	6
k-Plex73	4	0.667	3.818
k-Plex74	4	0.667	5.091
k-Plex75	4	0.833	5.676
k-Plex76	4	0.833	6
k-Plex77	4	0.667	3.818
k-Plex78	4	0.667	3.36
k-Plex79	4	0.667	3.818
k-Plex80	4	0.833	5.25
k-Plex81	4	0.667	4
k-Plex82	4	0.833	5.833
k-Plex83	4	0.667	4.8
k-Plex84	4	0.667	4.941
k-Plex85	4	0.667	4.667
k-Plex86	4	0.667	3.574
k-Plex87	4	0.667	6.462

k-Plex88	4	0.667	6.222
k-Plex89	4	0.667	5.091
k-Plex90	4	0.667	3.818
k-Plex91	4	0.667	3.818
k-Plex92	4	0.833	9.13
k-Plex93	4	0.667	4.541
k-Plex94	4	0.667	4.541
k-Plex95	4	0.667	4.421
k-Plex96	4	0.667	4.541
k-Plex97	4	0.667	4.2
k-Plex98	4	0.667	5.793
k-Plex99	4	0.667	6
k-Plex100	4	0.667	5.091
	... 479 more	... 479 more	... 479 more

Again, our list was cut off in k-plex 100. As exemplified in Table 12, the cohesion index of k-plex 1 is the highest (13.125), which in turn suggests that the inner link density of k-plex 1 is the highest. It is interesting to observe, on the other hand, that the number of nodes occurred in each k-plex is 4 or 5. This in turn indicates that 4 nodes or 5 nodes form a cohesive group. We thus conclude that 4 nodes in each k-plex generally form a cohesive group.

Now let us observe the map of k-plex. We eliminated many nodes since we couldn't include all of them in the map. In Figure 3, we included core nodes only:

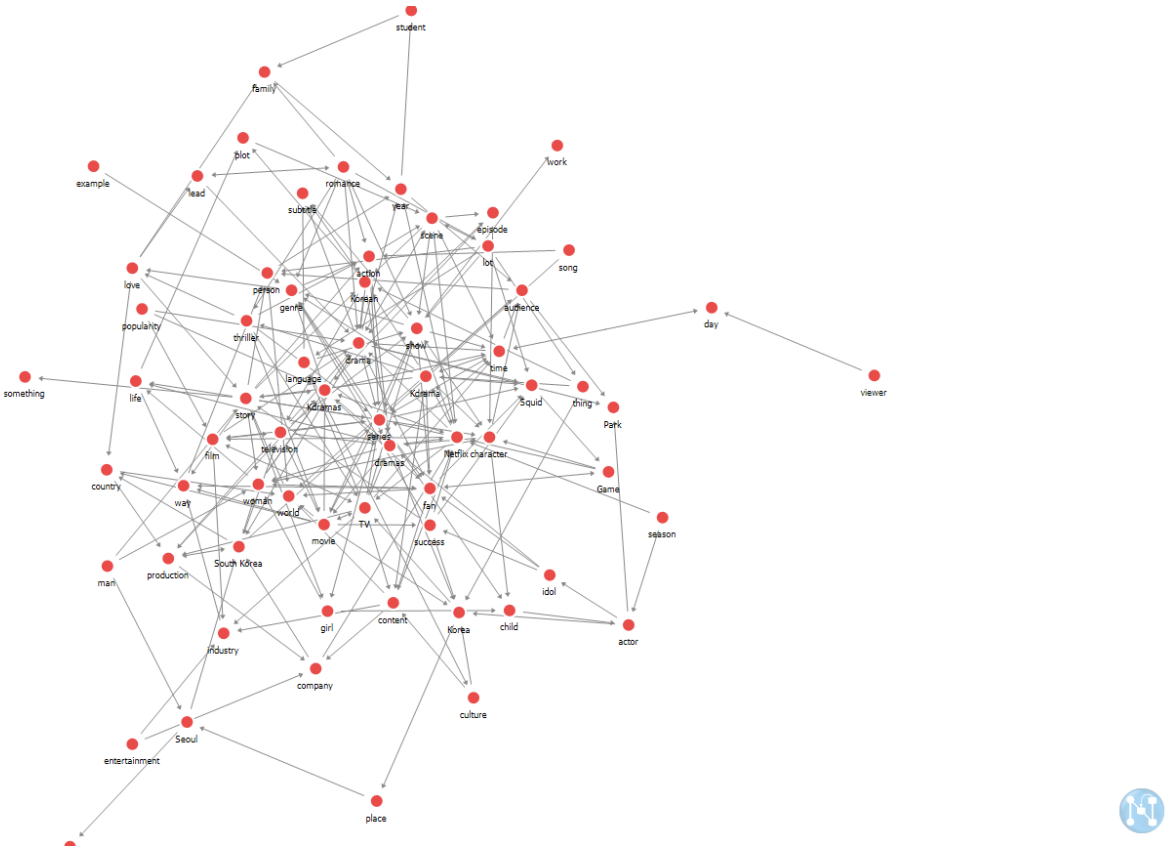


Figure 3 Map of k-plex

It is interesting to note that as shown in Figure 3, the words *world*, *story*, *person*, and *audience* form a cohesive group (k-plex 1). As exemplified in Figure 3, the word *world* is not linked to the word *audience*, but these nodes form a cohesive group since more than two nodes are linked. Exactly the same can be said of k-plex 14. As indicated in Figure 3, the words *world*, *series*, *story*, and *movie* form a cohesive group (k-plex 14), despite the fact that the word *movie* is not linked to the word *story*. In other words, 4 nodes are indirectly linked, thereby resulting in the same group.

K-core

In what follows, we aim at providing the structural properties of k-core. The term k-core refers to a set of nodes associated with more than k. The so-called k-core is also a term that is looser than the term clique. The value of k was fixed as 3 in NetMiner. Thus, the software package NetMiner permits 3 cores only. 3 cores mean that there are links with more than 3 words or 3 persons internally. The more the core index is high, the more words or people count as core in a group. Similarly, if the core index is high, words or people are regarded as the most closely related in a group. Note that in the case of k-core, the direction or weight of links is not considered. Table 13 shows information on k-core:

Table 13 Info on k-core

CORENESS	# OF NODES	# OF COMPONENT
5	24	1
4	44	1
3	54	1
2	61	1
1	67	1

In Table 13, the term coreness refers to the core index. If the index is high, it means the core of a network. It is important to note that as exemplified in Table 13, 24 nodes form a core structure since the core index is the highest. As illustrated in Table 13, the number of each component is the same (1). The term component refers to a set of nodes that are not unlinked (linked). It should be noted, on the other hand, that as can be seen from Table 13, 44 nodes occur near a core group since their core index is the second highest.

Finally, let us turn our attention to the map of k-core:

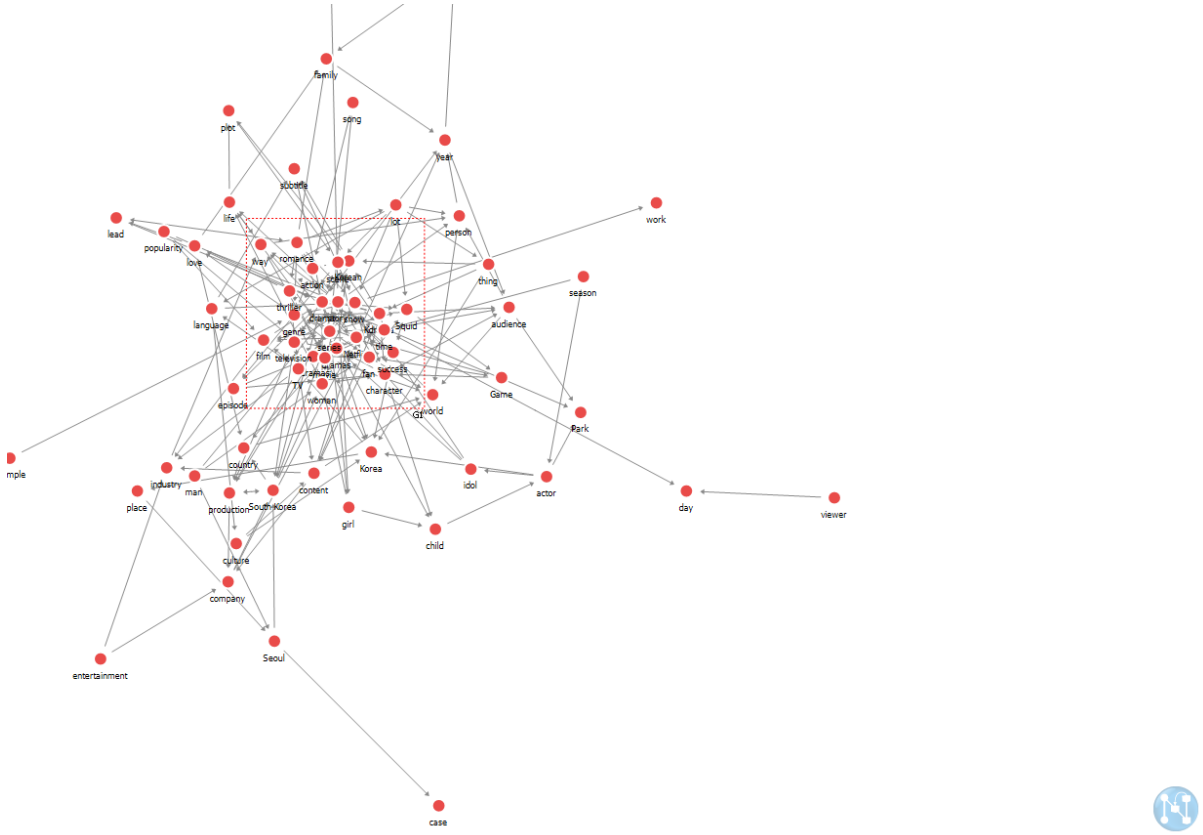


Figure 4 Map of k-core

It is important to mention that 24 nodes (words) occurred together in the square and that they form a core structure. More specifically, the words *Netflix*, *squid*, *series*, *thriller*, *romance*, *film*,

character, *success*, *show*, *television*, etc. appeared in the square and they themselves are linked to more than 3 words, thus becoming a core group. Note that a core group is located in the central place of a network. It is thus reasonable to conclude that if the core index is high, the relevant nodes are the core of a network. For the map of synonyms, see Kang (2022a, 2022b, 2022c, 2022d).

CONCLUSION

To sum up, 41 articles of Google about K-dramas were analyzed by the software package NetMiner. In section 2.1, we have provided network properties such as the number of links, average degree, components (weak and strong), inclusiveness, reciprocity (Arc and Dyad), transitivity, clustering coefficient, a mean distance, and a diameter of nodes. In section 2.2, we have argued that topic 4 was the most widely used one in 41 articles of Google, followed by topic 9, topic 1, and topic 12, in that order. In section 3.1, we have provided information on the number of cliques, their members, cohesion indices, and their map. The term clique means that all nodes in a group must be directly linked together. In section 3.2, we have also provided information on the number, size, members, and cohesion index of N-cliques and their map. The term n-clique refers to two-stage links. If links take place within three nodes (two stages), then they belong to the same group. In section 3.2, we have provided information on the number, size, members, density, and cohesion index of k-plex including its map. In section 3.3, we have provided information on the number, size, members, density, and cohesion index of k-plex. The term k-plex indicates that when the number of nodes in a group is n and every node in the group is linked together more than n-k, the group is called a cohesive group. Finally, we have provided structural properties such as the core index of k-core, the number of nodes and components, and its map. The value of k was fixed as 3 in NetMiner. Thus, the software package NetMiner permits 3 cores only.

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