The Effect of Internet Usage on Interpersonal Relationships: A Case Study

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Abstract

The Internet has become the fastest growing electronic technology in world history. The rapid evolution of any technology naturally raises questions about both its potential benefits and possible negative consequences. One of the main issues of concern is the effect Internet is having on interpersonal relationships. This paper investigates the influence of the Internet on social connections among Internet users in twelve major cities in Iran. The results show that the Internet has not decreased users' social contacts. Principal components analysis and the k-means clustering technique are applied to unearth the common patterns that exist in the dataset. Our findings show that gender is one of the main factors in distinguishing among users based on the type of their social contacts.

Keywords: internet users, users' behaviors, interpersonal relationships, Iran.

1. Introduction

The history of the Internet in Iran goes back to 1992. Initial development of the Internet in Iran was primarily for academic usage and was sponsored by the government. In recent years, however, Internet service provision for private users has been greatly expanded. As the usage increases, there is also an increasing need to understand the effect of Internet on interpersonal relationships and social connections. The concern is centered on whether the Internet is expanding the relationships or it is alienating people from their richer relations (Boase, J.; Horrigan, Wellman & Rainie 2006).

Some critics state that Internet use will decrease people's social contacts and involvement in communities (Berry 1993, Barlow et al. 2006, Fox 1995). They see "on-line" relations as different from "off-line" relations. Other scholars believe that the Internet allows people to contact with many others and facilitate the creation of new connections among people (Wellman 1997, Jones 1998, Quan-Haase et al. 2002, Wellman & Gulia 1999). In fact, social relations can be developed using the Internet, and these relations can affect people's everyday lives (Bastani 2001). For example, individuals can use their "on-line" relations as a way to find others who share their interests.

In this study, we examine the effect of Internet use on interpersonal relationships in twelve major cities in Iran. We investigate the social characteristics of participants (e.g., gender, age, education, marital status, ethnicity, etc.), and their impacts on the Internet user's interpersonal relationships. Since we are studying

social contacts among Internet users, we take a network analytic perspective because network analysis focuses on social relations and not on locality (Jones 1998, Wellman 1999).

We apply principal components analysis (PCA) to unearth the common pattern of user behavior. By applying the PCA technique, we seek to answer questions such as: 1) Is the Internet having a similar effect on social connections of users from different cities or belonging to different ethnic groups? 2) Is it having more influence on a particular age group or gender? 3) Can users be grouped using a summarized presentation, leading to groups that show similar user behavior?

By using the results from principal components analysis, it is possible to group users using a data clustering technique. There are many clustering algorithms that exist and could be used. For this review the *k-means* clustering algorithm was used. Using this technique, we distinguish users that display similar behavior from the others, and identify subgroups from the whole population.

The paper proceeds as follows: In Section 2 the experimental setting is introduced. Section 3 is concerned with demographics of Internet users in Iran. In Section 4, the effect of Internet on social contacts is discussed and the implementation and interpretation of the results of applying principal components analysis and the k-means clustering algorithm to the dataset are given. Finally, Section 5 concludes the paper with some final remarks and a discussion of future work.

2. Iranian Internet Project

In this paper we investigate the influence of the Internet on social connections among Internet users in Iran. The dataset was gathered as part of the Iranian Internet Project (IIP)[1]. IIP (Bastani 2005) is a comprehensive survey comparing Iranian Internet users and non-users across a wide range of variables with the goal of examining how the Internet influences the social, political, cultural and economic behavior and ideas of Iranians by examining the attitudes, values and perceptions of both Internet users and non-users. The key objective of this research project is to understand how the lives of individuals are being transformed by the emergence of new digital content and distribution channels. IIP is also a partner of the World Internet Project (UCLA Center for Communication Policy 2001) - an international research consortium made up of research centers in various countries around the world.

The data was collected in 2005. The sample represents urban population of capital cities of twelve provinces. Because of the lack of relevant studies and precise estimation of access to the Internet in various cities in the country, provinces were selected based on human development index (HDI) and the rate of access to telephone, which are considered to be necessary for having access to the Internet.

[1] The project has been supported by the IDB and TAKFA.

In 2005, 34 percent of the total interviewees go online and use the Internet. The study defines Internet use as effective Internet usage not just having the possibility to access online services. 66 percent of the respondents do not use the Internet. Non-users can be divided into two groups: 1) non-users who do not plan to go online within the next twelve month; and 2) intended users.

3. Demographics of Users

The question who is online is strongly linked with demographic factors. For example, Internet users tend to be young, single, and city born. Users have a higher level of education and socio-economic status. The following are a subset of attributes we considered in this study.

3.1 Gender

Within the group of users, 44 percent are female, and 56 percent male. From the survey results, 44.9 percent of male respondents have already adopted the Internet, while only 25.3 percent of female interviewees are using the Internet. This shows that a noticeable gender gap in terms of Internet usage exists in Iran.

3.2 Age

With a mean age of 24, most of the Internet users are young. Almost 80 percent of the users are under the age of 30. The Internet use by age group is shown in Table 1.

Table 1: Internet use by age groups

Age	Number of Individuals	Users (%)
16 and younger	207	32.9
16-24	914	52.4
25-34	631	32.0
35-44	367	19.6
45-54	235	11.5
55-64	116	7.8
65 and older	108	0.9

3.3 Marital Status

Martial status may also have an impact on Internet usage. In this research, we asked the interviewees about their marital status, including whether they were married, divorced, separated, widowed, or single (never married). The results show that 69.4 percent of respondents who are using the Internet are single, while only 28.8 percent of them are with spouses.

3.4 Level of Education

The survey results show that education is highly correlated with Internet usage. About 50 percent of Internet users have a bachelor's degree or higher. This may be due to the fact that Internet is based on high technology and its use requires a certain level of knowledge. Also, people with a higher level of education might find more useful information on the Internet.

3.5 Ethnicity

Previous studies indicate that in the information age, differences between various ethnic groups can still be observed (Castells 2001). Our findings support this view. Based on the results, 61.6 percent of users are Fars. Among different ethnic groups, the proportion of Turks who use the Internet to those that are non-users is less than other ethnic groups.

3.6 Income

The higher the respondent's income, the more likely s/he is an Internet user. More than 52 percent of the users belong to the groups with high and very high income (750,000 Rls. and higher per each family member in a household).

4. Internet and Social Contacts

The respondents were asked to indicate the effect of the Internet on their interpersonal relationships by stating whether or not the Internet has decreased, did not changed, or increased their contacts with different social groups. The social groups considered include individuals with similar level of education, age, interests and hobbies, occupation, religious beliefs and political interests, friends, relatives and household members. The results in Table 2 clearly shows that far away from alienating people from their richer relations, the Internet has had a positive overall effect on expanding interpersonal relationships among Iranians in the study.

To find a smaller set of underlying variables that can describe the data, principal components analysis (PCA) was performed. PCA is a multivariate statistical technique used to reduce a complex dataset to a lower dimension to reveal the sometimes hidden, simplified structure that often underlies it (Shlens 2005). In mathematical terms, from an initial set of *n* correlated variables, PCA creates uncorrelated components, where each component is a linear weighted combination of the initial variables. For example, from a set of *n* variables x_1 to x_n, the first *m* principal components (PC) are:

$$PC_1 = a_{11} x_1 + a_{12} x_2 + \ldots + a_{1n} x_n$$
$$\vdots$$
$$PC_m = a_{m1} x_1 + a_{m2} x_2 + \ldots + a_{mn} x_n$$

where a_{mn} represents the weight for the *m*th principal component and the *n*th variable. The uncorrelated property of the components is highlighted by the fact that they are perpendicular, which means the indices are measuring different dimensions of the data (Manly 1994). The components are ordered so that the first component (PC_1) explains the largest possible amount of variation in the original data, subject to the constraint that the sum of the squared weights for that component is equal to one. The second component (PC_2) is completely uncorrelated with the first component, and explains additional but less variation that the first component, subject to the same constraint. Subsequent components are uncorrelated with previous components, thus capturing an additional dimension in the data but explaining smaller proportions of the variation of the original variables. The higher the degree of correlation among the original variables in the data means that fewer components are required to capture common information.

Table 2: The effect of Internet use on interpersonal relationships

Type of Relationship	Effect of the Internet Use (% of Users)		
	Decreased	Did not Change	Increased
Relation with friends and relatives	13.9	58.9	27.3
Relation with coworkers	9.9	65.6	25.4
Relation with household members	14.3	69.0	16.7
Relation with individuals with similar hobbies	5.8	58.2	35.9
Relation with individuals with similar political interests	11.9	64.3	23.8
Relation with individuals of the same age	7.7	49.9	42.4
Relation with individuals with similar religious beliefs	12.8	66.1	21.1
Relation with individuals with similar level of education	5.7	47.8	46.5

The output from a PCA is a table of factor scores or weights for each variable (Table 3). Because the variables share the same scale the weight controls the contribution that each variable makes to the component score. Variables with large magnitude weights in the principal component vector are more important and the ones with similar magnitudes are correlated.

The results of PCA (see Table 3) identified three main components for the effect of the Internet on interpersonal relationships. These three factors together capture more than 54 percent of the total variation. The first factor is concerned with people who are similar to each other with respect to their level of education, age, hobbies and occupation, and accounts for more than 23 percent of the total variation. The results about the first component, which can be referred to as the socio-economic similarity, show that only a small percentage of the respondents (between 5.7-9.9 percent) believe that the Internet has decreased their relationships in the specified cases, while the majority (between 47.8-65.6 percent) state that the Internet has not had any effect on these relationships and their level has not changed. A smaller but relatively large portion of the respondents emphasize that their social contacts has increased due to Internet use.

The second component only consists of people with relationships with friends, relatives, and household members. This factor accounts for 15.86 percent of the variation in the original data. The third factor, which can be called religious-political similarity, includes people with similar religious beliefs and political interests. This component accounts for 15.45 percent of the total variation.

Table 3: The result of PCA for the effect of Internet on social contacts.

Type of Relationship	Factor Scores (Weights)		
	PC1	PC2	PC3
Individuals with similar level of education	0.760		
Individuals of the same age	0.686		
Individuals with similar hobbies	0.638		
Coworkers	0.452		
Friends and relatives		0.749	
Household members		0.569	
Individuals with similar religious beliefs			0.749
Individuals with similar political interests			0.586

We also applied PCA to the dataset consisting of the demographic variables of users along with the increase in social connections to find whether or not an underlying structure exists. Data in categorical form are not suitable for PCA, as the categories are converted into a quantitative scale which does not have any meaning. To avoid this, a number of binary variables from qualitative categorical variables were constructed. As the nature of categorical variables is that there is not hierarchical relationship between the variables, their conversion into binary variables and inclusion as additional variables does not change the relationship between the variables nor add any additional variation or correlation in the dataset.

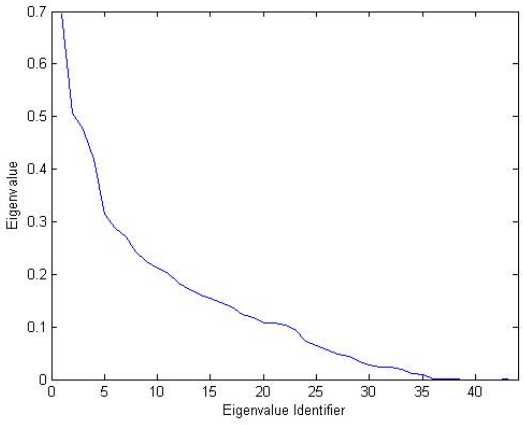

Figure 1: Eigenvalue spectrum for the dataset

The most important property that is considered in PCA is that whether the dataset can be characterized by a few PCs. The eigenvalue (variance) for each principal component indicates the percentage of variation in the total data explained. By examining the eigenvalue spectrum (Figure 1), the number of principal components can be determined.

From Figure 1 it can be observed that the variation in the original dataset is distributed across a large set of PCs. About 55 percent of the PCs are carrying some non-negligible variation (i.e., more than 10 percent of the variation captured in the most important PC) of the original dataset. The first principal component accounts for only 11.81 percent of total variation. This percentage is not high, and could reflect the number of variables included in the analysis or the complexity of correlations between variables. Nevertheless, by using 16 percent of the PCs (i.e., the top 7 PCs out of 43), it is possible to capture more than 50 percent of variation, and by using 30 percent of the PCs (i.e. the top 13 PCs out of 43) more than 70 percent of variation can be captured.

Results from the top 10 principal components are shown in Table 4. The variables making the most important contribution to each component (those that have weight > 0.2 are considered important) have their weight shown in bold.

Table 4: Results from principal components analysis

Variable Description	Factor Scores (Weights)									
	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10
Male	0.0865	**0.6312**	-0.2664	-0.0652	0.0135	0.0583	-0.0470	0.0132	-0.0528	0.0061
Female	-0.0865	-0.6312	**0.2664**	0.0652	-0.0135	-0.0583	0.0470	-0.0132	0.0528	-0.0061
Age										
16 and younger	0.0424	0.0182	-0.0543	0.0403	-0.0664	-0.3216	0.0065	-0.0700	0.0538	0.0440
16-24	**0.4179**	-0.1797	-0.0600	0.0728	0.1177	**0.4240**	-0.1051	0.0031	-0.0867	-0.1411
25-34	-0.2832	0.1204	0.0954	-0.0907	0.0785	-0.1271	0.0568	0.0856	0.1231	**0.2011**
35-44	-0.1202	0.0214	0.0131	-0.0114	-0.1079	0.0113	0.0370	-0.0204	-0.0591	-0.0923
45-54	-0.0450	0.0111	-0.0019	-0.0025	-0.0063	0.0084	0.0110	0.0056	-0.0225	-0.0217
55-64	-0.0103	0.0070	0.0087	-0.0095	-0.0115	0.0025	-0.0055	-0.0034	-0.0069	0.0089
65 and older	-0.0016	0.0016	-0.0009	0.0011	-0.0040	0.0025	-0.0007	-0.0004	-0.0017	0.0011
Marital status										
Never married	**0.4487**	-0.0557	-0.1373	0.1479	**0.2445**	-0.0773	-0.0496	0.0377	0.1387	0.0570
Married	-0.4434	0.0573	0.1377	-0.1329	-0.2376	0.0828	0.0568	-0.0432	-0.1251	-0.0486
Widowed/Divorced/Separated	-0.0053	-0.0015	-0.0005	-0.0150	-0.0069	-0.0055	-0.0071	0.0055	-0.0136	-0.0084
Ethnicity										
Fars	-0.0703	0.0382	-0.1251	**0.5211**	-0.0173	0.1635	**0.4928**	-0.2074	0.0217	**0.2373**
Kurd	-0.0185	0.0144	0.0474	-0.0513	0.0088	-0.0003	-0.0362	0.0592	0.0399	-0.0856
Turk	0.0391	-0.0700	0.0660	-0.2796	0.0134	-0.0534	-0.3696	0.0538	-0.0229	**0.3059**
Lor	0.0040	0.0073	0.0100	-0.0452	0.0266	-0.0286	-0.0321	0.0277	-0.0149	-0.0997
Gilak	0.0216	0.0077	0.0026	-0.0723	0.0105	-0.0398	-0.0223	0.0884	-0.0200	-0.2306
Other	0.0240	0.0024	-0.0008	-0.0727	-0.0420	-0.0414	-0.0327	-0.0216	-0.0037	-0.1273
Level of education										
Illiterate	0.0038	-0.0065	-0.0011	0.0114	-0.0144	-0.0110	0.0162	-0.0163	-0.0115	-0.0095
Primary school	-0.0057	-0.0026	0.0012	-0.0064	-0.0099	-0.0062	0.0036	-0.0062	-0.0083	0.0100
Attending high school	0.1791	-0.0076	-0.0993	0.0556	-0.1444	-0.5603	-0.0033	-0.1683	0.1317	0.0078
High school diploma/2-year college	0.1160	-0.0732	-0.0749	-0.0891	-0.4775	**0.4199**	0.0198	**0.2058**	-0.1208	0.0751
Undergraduate degree	-0.2446	0.0635	0.1652	0.0347	**0.7267**	0.1692	-0.0274	0.0212	-0.0429	-0.0715
Higher	-0.0486	0.0264	0.0088	-0.0063	-0.0805	-0.0116	-0.0090	-0.0362	0.0517	-0.0118
City (classification based on HDI and telephone rate)										
Very low	-0.0100	0.0302	0.0535	-0.0539	0.0107	-0.0047	0.0794	0.0262	0.0368	-0.1208
Low	0.0003	0.0060	0.0054	-0.0258	0.0138	-0.0061	0.0117	0.0001	-0.0100	-0.0462
Medium	0.0798	0.0025	0.0942	-0.3025	0.0374	0.1104	-0.0566	-0.2226	0.0354	**0.4902**
High	0.0642	-0.0098	0.0046	-0.1343	0.0242	-0.0806	0.0462	0.0685	-0.0096	-0.4097
Very high	0.0334	0.0136	0.0319	0.0105	-0.0221	0.0464	**0.2975**	-0.2048	0.1334	-0.0321
Tehran	-0.1677	-0.0426	-0.1896	**0.5061**	-0.0641	-0.0654	-0.3782	**0.3327**	-0.1861	0.1186
Income										
Very low	0.0600	-0.0017	-0.0068	-0.0579	0.0673	0.0044	0.1074	-0.0784	0.0381	0.0117
Low	0.1187	-0.0261	0.0426	-0.0936	-0.0369	0.0445	0.1069	-0.1129	0.0990	0.0532
Medium	0.0720	0.0221	0.0149	-0.1279	0.0006	-0.0446	0.0420	-0.0292	-0.3131	-0.0959
High	-0.0249	-0.0234	-0.0128	0.0249	0.0591	-0.1500	**0.2243**	**0.5940**	-0.0794	0.1506
Very high	-0.2258	0.0290	-0.0379	**0.2546**	-0.0901	0.1457	-0.4807	-0.3735	**0.2555**	-0.1195
Increase in interpersonal relationships										
Individuals with similar level of education	0.0942	0.1672	**0.3337**	0.1134	-0.1064	-0.0314	-0.0501	0.0814	0.1324	-0.2947
Individuals of the same age	0.0453	0.1068	0.1658	0.0507	-0.0792	0.1262	-0.0175	0.1984	**0.4932**	0.0093
Individuals with similar hobbies	0.0260	0.0573	0.1636	0.0653	-0.0913	0.0335	0.0405	0.1786	**0.3427**	-0.0420
Coworkers	0.0930	0.0461	**0.2135**	0.1539	-0.0397	-0.1085	-0.0166	-0.2243	-0.4852	-0.0092
Friends and relatives	0.0101	0.1444	**0.2004**	0.0340	-0.0588	0.1232	0.0889	0.0037	-0.0611	-0.0782
Household members	0.0245	0.0305	0.1272	0.0844	-0.0458	-0.0912	0.0572	-0.0457	-0.1503	-0.1798
Individuals with similar religious beliefs	**0.2042**	0.1332	**0.4343**	0.1584	-0.0499	-0.0350	-0.1546	-0.0077	-0.0947	0.1213
Individuals with similar political interests	0.1454	**0.2054**	**0.4802**	0.1380	-0.0152	-0.0220	0.0018	0.0487	-0.0693	**0.2104**

The first component shows that people who mentioned an increase in their relationships with individuals of similar religious belief are mainly in the age range of 16-24 and single. One interesting observation is that being male and increase in relationships with individuals of similar political interests are highly correlated (see results for PC2). The third principle component indicates a correspondence between being female and reporting increase in most types of social contacts. Overall the results show that Internet use has not had major effects on users' relationships with household members and friends and relatives. Also, it is worth mentioning that although ethnicity is an important factor in access and use of the Internet, it is not a significant factor when it comes to social contacts.

4.1 Application of K-Means Clustering

Clustering is the problem of partitioning a finite set of data points in a multidimensional space into classes so that the points belonging to the same class are similar and the points belonging to different classes are dissimilar (Manly 1994). In this section, the *k-means* clustering algorithm, one of the widely used clustering techniques, is briefly reviewed and the results of applying it to the dataset are discussed.

The aim of the k-means clustering algorithm is to partition the data into *k* clusters so that the within-group sum of squares is minimized (Webb 1999). The k-means algorithm used here is based on alternating two procedures. The first is one of assignment of data points to clusters. A data point is assigned to the cluster whose mean it is closest to.

$$c_n^{t+1} = \arg\min_k (x^n - \mu_k^t)^T V^{-1} (x^n - \mu_k^t)$$

where **V** is the matrix of covariance and μ_k is the mean of the *k*th cluster. The second procedure is the calculation of new cluster means based on the assignments.

$$\mu_k^{t+1} = \frac{\sum_n z_{kn} V x^n}{\sum_n z_{kn}}$$

z_{kn} = 1 if the *n*th data point belongs to the *k*th cluster and 0 otherwise. The process terminates when no movement of a data point to another cluster will reduce the within-group sum of squares.

We applied k-means to the dataset consisting of the demographic variables of users along with the increase in social connections. The algorithm was run for 50 iterations with random restarts for *k* = 2, 3, 4, 5, 10, and 20. The best results for the total sum of distances for each *k* were 4603.6, 4307.8, 4169.1, 4035.3, 3615.1, and 3199.6 respectively. Figure 2 shows the plots of spatial distribution of the two-dimensional projection of the dataset, as clustered by the k-means algorithm: (a) k = 3, (b) k = 4, (c) k = 5.

By examining the means for each cluster, it is possible to assess how distinct the *k* clusters are. Table 5 reports the means for clusters for the value of $k = 3$ and $k = 4$.

For $k = 3$, the comparison of the mean values for each variable indicates that gender, marital status, level of education, and income play an important part in distinguishing between clusters. For clusters 1 and 2, gender is the main factor which splits the users. The individuals in these two clusters are mainly single and within the age range of 16-24. The results indicate that for the first cluster which consists of only males, the increase in relationship with individuals with similar political interests is more significant than those for the second cluster which consists of only females. On the other hand, the increase in relationship with individuals with similar religious beliefs is more evident in the second cluster. The third cluster is split between males and females who are mostly married and with in the age group of 25-34. The level of education and income are higher in this cluster.

For $k = 4$, the main factor for distinguishing between the clusters is gender. It is apparent that the third cluster for $k = 3$ is split into two new clusters (cluster 2 and 3). Aside to gender, what makes these two clusters different refers to different types of social contacts.

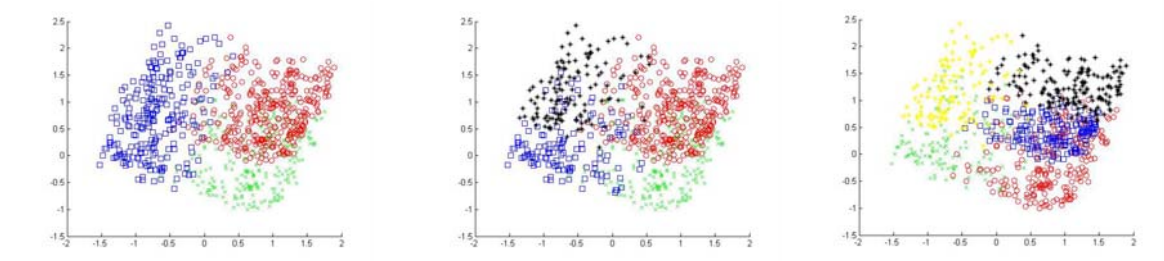

Figure 2: Plots of the spatial distribution of the two-dimensional projection of the dataset, as clustered by the k-means algorithm: (a) k = 3, (b) k = 4, (c) k = 5. Different clusters are indicated with different marks.

Table 5: Means for clusters for *k* = 3 and 4

Variable Description	K = 3			K = 4			
	Cluster 1	Cluster 2	Cluster 3	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Male	1.0000	0.0000	0.5272	0.0000	1.0000	0.0000	1.0000
Female	0.0000	1.0000	0.4728	1.0000	0.0000	1.0000	0.0000
Age							
16 and younger	0.1226	0.0902	0.0000	0.0976	0.0000	0.0000	0.1239
16-24	0.7019	0.7744	0.0879	0.7602	0.0769	0.2556	0.6986
25-34	0.1671	0.1128	0.4937	0.1179	0.4615	0.4436	0.1690
35-44	0.0056	0.0188	0.2762	0.0203	0.2923	0.2105	0.0056
45-54	0.0028	0.0038	0.1004	0.0041	0.1154	0.0677	0.0028
55-64	0.0000	0.0000	0.0377	0.0000	0.0462	0.0226	0.0000
65 and older	0.0000	0.0000	0.0042	0.0000	0.0077	0.0000	0.0000
Marital status							
Never married	0.9666	0.9173	0.0000	0.9919	0.0000	0.0000	0.9775
Married	0.0167	0.0714	0.9749	0.0000	0.9846	0.9624	0.0056
Widowed/Divorced/Separated	0.0167	0.0113	0.0251	0.0081	0.0154	0.0376	0.0169
Ethnicity							
Fars	0.6212	0.5940	0.6318	0.6057	0.6308	0.6015	0.6225
Kurd	0.0390	0.0526	0.0795	0.0528	0.0846	0.0677	0.0394
Turk	0.1560	0.1992	0.1548	0.1992	0.1077	0.2030	0.1577
Lor	0.0557	0.0376	0.0418	0.0407	0.0385	0.0451	0.0535
Gilak	0.0696	0.0602	0.0418	0.0569	0.0615	0.0301	0.0704
Other	0.0585	0.0564	0.0502	0.0447	0.0769	0.0526	0.0563
Level of education							
Illiterate	0.0279	0.0376	0.0209	0.0407	0.0231	0.0226	0.0254
Primary school	0.0056	0.0000	0.0209	0.0000	0.0077	0.0301	0.0056
Attending high school	0.3036	0.2632	0.0460	0.2724	0.0462	0.0602	0.3070
High school diploma/2-year college	0.2869	0.2970	0.1799	0.2764	0.2000	0.2331	0.2817
Undergraduate degree	0.3538	0.3722	0.6067	0.3780	0.5692	0.5789	0.3577
Higher	0.0223	0.0301	0.1255	0.0325	0.1538	0.0752	0.0225
City (classification based on HDI and telephone rate)							
Very low (Kermanshah, Zahedan)	0.0641	0.0602	0.1004	0.0610	0.1231	0.0827	0.0592
Low (Bandar-Abbas, Khoramabad)	0.0390	0.0263	0.0377	0.0285	0.0308	0.0376	0.0394
Medium (Tabriz, Mash'had)	0.2145	0.2030	0.1799	0.1951	0.1846	0.1880	0.2169
High (Ahvaz, Rasht)	0.1309	0.1316	0.0586	0.1301	0.0615	0.0677	0.1324
Very high (Isfahan, Ghasvin, Qom)	0.1448	0.1241	0.1213	0.1260	0.0846	0.1504	0.1465
Tehran	0.4067	0.4549	0.5021	0.4593	0.5154	0.4737	0.4056
Income							
Very low	0.1588	0.1466	0.0711	0.1463	0.0692	0.0827	0.1606
Low	0.1727	0.2143	0.0795	0.2114	0.1000	0.0827	0.1746
Medium	0.2256	0.1617	0.1590	0.1667	0.1615	0.1654	0.2197
High	0.2033	0.2293	0.1967	0.2195	0.1846	0.2331	0.2028
Very high	0.2396	0.2481	0.4937	0.2561	0.4846	0.4361	0.2423
Increase in interpersonal relationships							
Individuals with similar level of education	0.3760	0.3383	0.3264	0.3496	0.3538	0.2857	0.3746
Individuals of the same age	0.2256	0.2180	0.2259	0.2276	0.2923	0.1429	0.2254
Individuals with similar hobbies	0.1838	0.2105	0.2134	0.2154	0.2308	0.1880	0.1831
Coworkers	0.2897	0.2970	0.1967	0.2967	0.1615	0.2481	0.2901
Friends and relatives	0.2117	0.1692	0.2636	0.1748	0.3308	0.1805	0.2085
Household members	0.1616	0.1617	0.1715	0.1667	0.1385	0.1955	0.1606
Individuals with similar religious beliefs	0.4568	0.4812	0.2762	0.4675	0.3154	0.3158	0.4507
Individuals with similar political interests	0.4875	0.4624	0.3891	0.4675	0.4231	0.3684	0.4845

5. Discussion

The focus of this paper was on investigating the influence of the Internet on social connections among Internet users in twelve major cities in Iran. Our results show that far away from alienating people from their richer relations, the Internet has not changed the relationships significantly for most respondents, and for a noticeable portion of the Iranians in the study it has increased their social contacts with different groups.

The principal components analysis was applied to the dataset to unearth the common pattern of user behavior. Increase in social contacts is more evident among women. This is despite the fact that there is a significant gender gap in Internet use in Iran. This finding suggests that as maintaining relationships is important for women in offline world, it is also important for them when they are online. Another interesting finding is that although ethnicity plays a major role in having access to the Internet, it does not have a significant impact on social contacts.

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