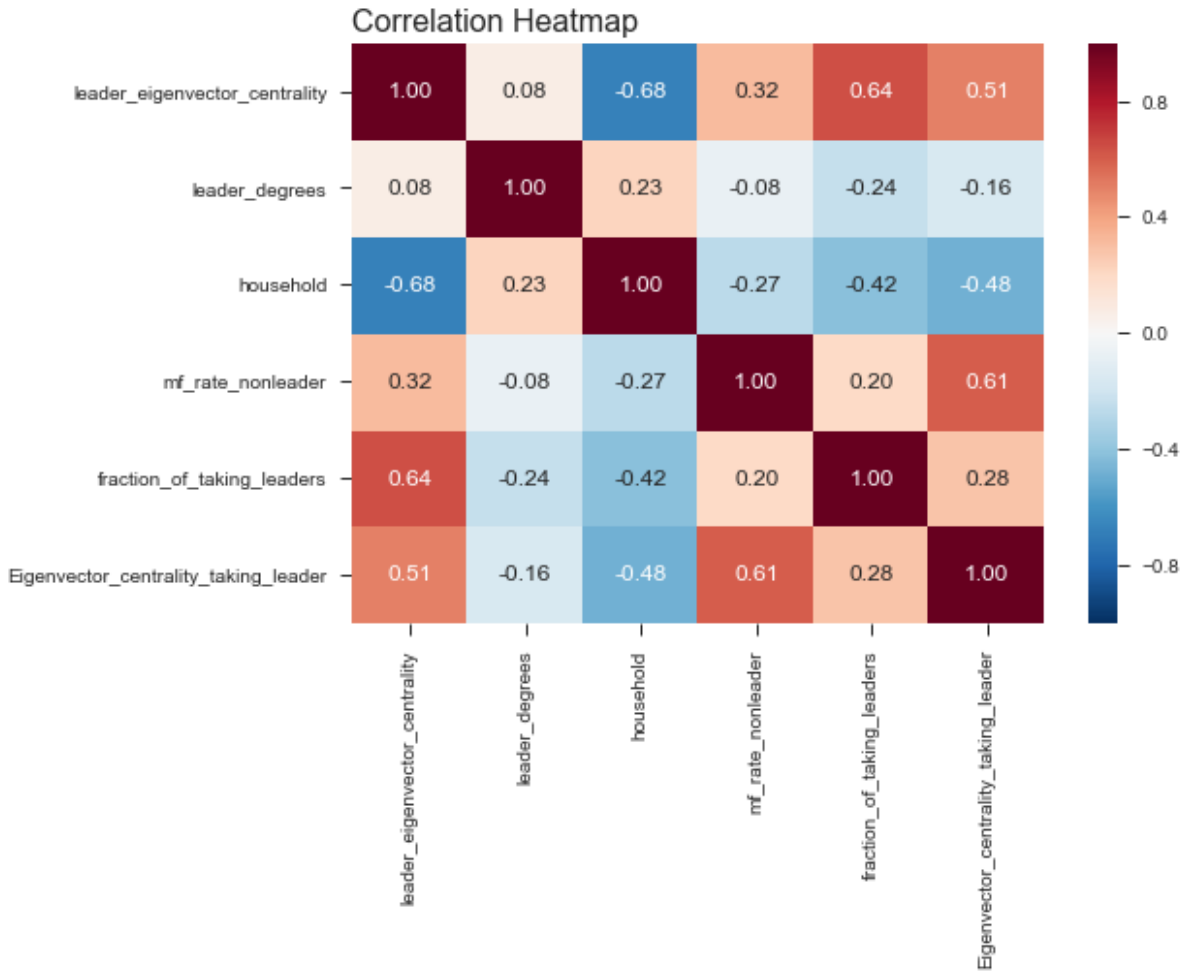
Injection Points Matter in the Diffusion of Microfinance Project

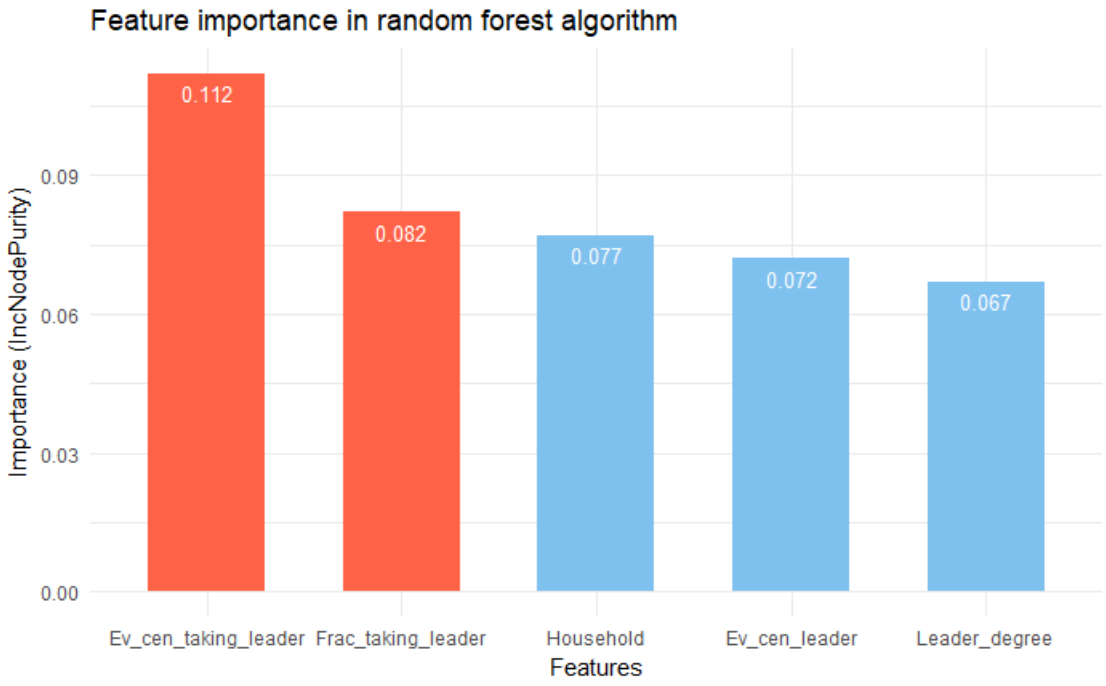
How do the first individuals receiving information in the social network influence the final take-up rate of a microfinance project? To answer this question, this research analyzed the data collected by a team of researchers from MIT and Stanford University when they studied the diffusion of participation in a program of Bharatha Swamuki Samsthe (BSS), a microfinance institution, in 77 villages in India.

The microfinance project take-up rate among non-leaders in villages is positively correlated to the eigenvector centrality [1] of taking leaders, eigenvector centrality of leader and fraction of taking leaders, and negatively correlated with the number of households.

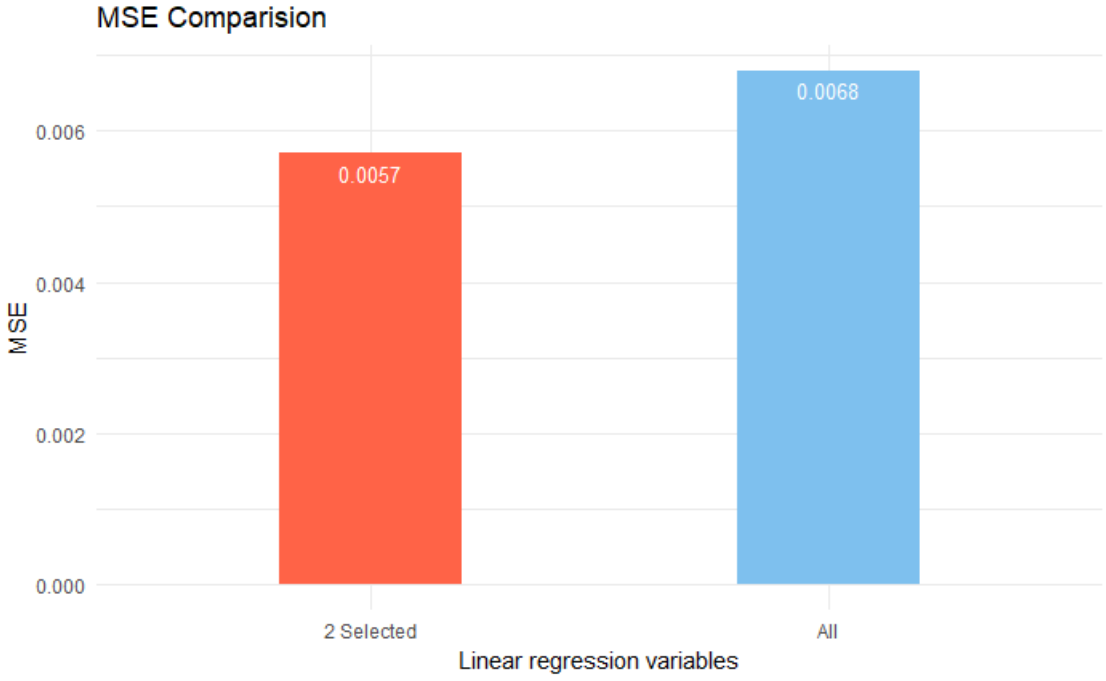


Feature selection in random forest algorithm shows that the most important features are eigenvector centrality of taking leaders and fraction of taking leaders, whose importance are 0.112 and 0.082 respectively. The importance of the number of households ranks the third, which is 0.077, while the importance of eigenvector centrality of leaders is relatively low, which is 0.072. The importance of leader degree is the smallest, only 0.067, indicating that the total connection of the leaders is not as important as connecting important people.

[1] The eigenvector centrality measures the importance of individuals in a social network, the higher the value, the more important the individual is in his social group. This value can be computed by networkx function eigenvector centrality() to the network in Python.



When trying to predict the project take-up rate of non-leaders, using the two important variables instead of all variables in linear regression can reduce the MSE by 17%, which is from 0.0068 to 0.0057. This result shows that using eigenvector centrality of taking leaders and fraction of taking leaders as variables to predict the final take-up rate of this micro-finance project is better than using all variables.



Since the two important variables is positively correlated with the non-leaders take-up rate, when the institution introduces this project into a new social group, it is recommended to introduce the project to those people who have high eigenvector centrality and is highly likely to accept the product or project first to gain a higher market penetrate rate.

** Data download: https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/21538*