Science Academies' Summer Research Fellowship Programme
4-Week Report

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Application no. – MATS896

I started my internship with Dr. Sudarshan Iyengar from May 21, 2018.

My research project is in social networking.

Firstly, I was asked to read papers related to degree ranking using local information, a faster method to estimate closeness centrality ranking, onion like network topology and robust networks and learnt various centrality measures which includes degree rank, closeness rank and four methods to estimate degree rank of a node without having the entire network. These methods use a small snapshot of the network that is collected using random walk, uniform sampling and metropolis hastings random walk sampling techniques and Poisson degree distribution method for degree ranking of random networks. I came to know a heuristic method to fast estimate the closeness rank of a node, verified graph between closeness centrality and degree centrality. From papers on robust networks and onion structure, I learnt a measure for robustness of networks against malicious attacks, which focuses on the evolution of the size of the largest connected cluster during the attack, outperforms the common robustness measure, a method that increases the robustness of network against high degree adaptive attack while keeping the degree of the network nodes unchanged and explored about smart rewiring for network robustness and studied rewiring strategy for world air transportation network. By this an improvement of thirty percent in its overall robustness can be achieved through swaps of around nine percent of its links.

I was asked to work on the problem – why percentage average absolute error is exponentially decreasing with increasing network size. I tried it by taking two graphs, calculated their variance of ranking by using degree rank and closeness rank and also calculated percentage average absolute error. I got to know more about Game Theory from the workshop organised by my guide.

Now, my professor asked me to explore more about various ways to increase robustness of a network.