# RANDOM WALKS ON EXPANDER GRAPHS

Yicheng Shao ‘16
Adviser: Takunari Miyazaki

Expander graphs are families of graphs that are both highly connected and sparse. Such graphs allow many nodes to communicate with one another using least resources. Expander graphs are also effective tools to mimic randomness. In particular, random walks on graphs define stochastic processes of selecting series of vertices in which every vertex is chosen uniformly from the neighbors of its previous vertex.

The objective of this project is to improve pseudorandom number generation by performing random walks on expander graphs. Since pseudorandom numbers are not truly random, all sequences of pseudorandom numbers have repeating patterns. The length of repetition is called the period length, and the quality of pseudorandom numbers can be measured by such a length. In this project, we increase the period lengths of sequences of pseudorandom numbers by performing random walks on expander graphs.

In this project, we focused on 3-regular graphs (in which all vertices have exactly three neighbors). Our experimental results show that performing random walks on expander graphs can increase the period lengths of the original sequences of pseudorandom numbers up to 500 times.