Fall Colloquium Series

Student Talks:

MIT Summer Research Program: Swimming of Cells

Grace Lim

Text Recognition through Computational Topology

Aaron Gaut

Cal Poly Pomona

Abstracts:

Lim: Microorganisms such as bacteria and algae typically live in complex porous environments like soil and biological tissue. It is challenging to characterize accurately the movement of microorganisms under these conditions for their motion is neither completely random nor fully deterministic. For our project, we develop a persistent random walk model described by a Markov chain for the motion of swimming cells in an idealized lattice-like porous medium. From the fundamental matrix of the Markov chain, we numerically compute the first passage time in MATLAB to determine the effects of drift, diffusion, and lattice structure on microbial transport.

Gaut: The purpose of this research is to find methods of extracting text from images using ideas from computational topology. The focus is on classifying individual letters based on invariants: quantities that remain the same as a letter is deformed. The research examines counts of components, cycles, ends, segments, forks, and crosses as potential invariants, with moderate success.

Wednesday, October 8, 1:05 - 1:50pm in 3-1639