

Murmurations: A Journey to a New Dawn for AI-assisted Mathematics

Abstract

Over the past few years, AI has begun to reshape our perception of how we do research in Mathematics. ML techniques are increasingly serving as tools to reveal hidden patterns in data that become the seeds of new conjectures and theorems. In this talk, we explore this emerging paradigm through its most striking example: the discovery of “murmurations” in number theory. First noticed when applying machine learning to large datasets of elliptic curves, murmurations are surprising oscillating patterns arising in the L -function coefficients of the arithmetic objects. Using murmurations as a case study, we discuss what this new mode of doing AI-assisted mathematics looks like in practice—how AI can act as a conjecture-generating “microscope” that involves human mathematicians to look for new techniques and machineries.



Figure 1: A murmuration of starlings at Gretna. (Photo by Walter Baxter, CC BY-SA 2.0.)