

Using AI to Model Real-World Systems: From Weather to Economics

Seyyed Ali Mohammadiyeh

Department of Pure Mathematics, Faculty of Mathematical Sciences,
University of Kashan, Kashan 87317-53153, I. R. Iran

April 6, 2025

Abstract

Many real-world systems—such as the weather, financial markets, and ecosystems—change over time in ways that are difficult to predict. Traditionally, we have used mathematical tools like differential equations and dynamical systems theory to understand them. However, with the rise of AI, we now have new ways to model and make sense of these complex patterns.

In this talk, I will explore how machine learning and neural networks can be used to build models of real-world dynamical systems. I will share examples from weather forecasting or economic trends where AI shines, where it struggles, and how it can complement traditional models. We'll look at modern techniques like LSTMs, and discuss why blending AI with domain knowledge often leads to better, more reliable results.

Whether you're coming from a math, computer science, or applied research background, this talk will offer practical insights into how AI and dynamical systems can work together to solve real-world problems.