ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

Invitation to the Presentation about the Workplacement

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"SDEs and a First Approach to Research"

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Abstract

During August and September 2025, I had the opportunity to join the Statistics Department at the University of Klagenfurt as a research assistant. During this period, I was introduced to academic research under the supervision of Dr. Benjamin Robinson.

The main objective of this internship was to contribute to scientific research on the strong convergence order of numerical approximations for stochastic differential equations (SDEs), with a particular focus on the Euler–Maruyama (EM) scheme.

As I had no prior background in SDEs, I spent the first three weeks studying the subject by reading technical textbooks. To properly define a SDE, I began by introducing the Itô integral, also known as the stochastic integral, thereby providing a precise mathematical meaning to one of the terms appearing in the SDE. After that, the question of whether a unique solution exists and under what conditions arose. Therefore, I studied the existence and uniqueness theorem for solutions under suitable regularity assumptions

on the coefficients. This preparatory work concluded with an introduction to the main numerical approximation method, namely the EM scheme, together with an analysis of its weak and strong convergence rates under regular assumptions.
Afterwards, I worked on several research papers in which the existence and uniqueness of solutions to SDEs were established under non-smooth assumptions on the coefficients. Finally, once the uniqueness of the solution was ensured, the strong convergence order of the EM scheme was derived, showing that in some cases the same convergence rates as in the smooth-coefficient setting were achieved.
This experience has been extremely enriching and has made me realize even more clearly that pursuing research is the natural next step in my academic career, and the one I want to take.

Benjamin Robinson and the Department of Statistics look forward to seeing you at the talk!