統計科學研究所
INSTITUTE OF STATISTICAL SCIENCE

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Seminar

Title：Using deep learning to understand the evolution of animal morphology

Speaker：Dr. Sheng-Feng Shen
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Time：10:30 AM~12:00 PM, Monday, May 9, 2022

Place：Presented by Webex Meeting

Abstract

How the seemingly infinite number of living forms on Earth evolved is a question that has interested biologists since Darwin's time and is considered to be one of the keys to understanding the evolution of life. However, how to objectively quantify and analyze a large number of biological forms has always been a difficult problem to solve. Recent breakthroughs in artificial intelligence and computer vision have provided possible solutions. Therefore, in this research project, we plan to apply deep learning methods to quantify the morphological diversity of major taxa of moths, sharks, and birds worldwide. We will use YOLOv4 to automatically detect, locate, and acquire biological images in photographs for analysis, train Convolutional Neural Network (CNN) to extract and quantify species feature patterns and use Variational Auto-Encoder (VAE) to generate explainable corresponding images of quantified features. We will use these objective computer vision methods to perform large-scale morphological analyses of animals to understand how evolutionary history and environmental pressures have shaped the evolution of these taxa' s morphological diversity. We believe that our research will revolutionize past studies that require subjective human definitions of animal characteristics.

※ Lecture in English.