

Automated Pollen Source Analysis using Deep Convolutional Neural Networks

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Palynology is the study of pollen grains and spores produced by plants. It has applications in a plethora of disciplines like geology, botany, paleontology, archeology, pedology, physical geography, and ecology. Recently, pollen source analysis is being actively used in the field of forensics, biometrics, and pharmacy. This variety of applications stems due to the fact that pollen does not easily decay and hence it can be used to determine its source of origin. Pollen can be identified to the genus or even to the species level by observing the size, shape, and surface texturing of the pollen grain. Traditionally, pollen identification and source analysis were manually done by botanical experts using microscopy. More recently, automatic, accurate, and faster techniques for pollen identification and source analysis are being developed using pollen image data. Our goal is to improve the accuracy as well as the speed of the image-based automatic pollen identification using Convolutional Neural Networks (CNN). We are in the process of building a large dataset of pollen grain images (over 10,000 images) belonging to 900 plant genera from all around the world. We plan to apply our methods for automatic classification of these images with high speed and accuracy.