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Project Title: Automatic identification for paleoclimatology: Preliminary study

Abstract:

In recent years, deep supervised learning using convolutional neural networks has led to dramatic improvements in the performance of computer vision algorithms. The goal of computer vision is to automate tasks that involve parsing information from visual data, such as species identification.

Paleoclimatology, the research field focusing on reconstructing past climate, largely relies on small fossils, so called microfossils. Their faunal or chemical composition is primary information/proxies to reconstruct past temperature, salinity, ocean circulation, etc. However, identification of microfossil species, which is essential not only to know faunal composition but also chemical composition, is difficult and requires substantial training and experience. Thus here we plan to apply computer vision techniques to perform automatic identification of microfossil species using convolutional neural networks. This system has huge potential to aid the field of paleoclimatology by speeding up the identification process. One such system has been developed in Yale University by our collaborator and primarily used to study a group of microfossils, planktonic foraminifera. Unfortunately such systems are seldom available in SE Asia. We will develop this automated imaging and identification system here in HKU for the first time in Asia. Since species of microfossils are not globally distributed. It is important to establish an Asian hub to enhance research efficiency.