Artificial Intelligence and Micropaleontology: a case study from the Eocene genus *Podocyrtis*

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The work of a micropaleontologist demands hours of quantitative collection of data and classification that can in many cases be extremely challenging and not many taxonomic experts exist. In order to solve this problem, artificial intelligence is here being used to automatically classify closely related morphological species of *Podocyrtis*, an Eocene genus that has an excellent and widespread record that allows its various species to be used in Middle Eocene biostratigraphy of oceanic sediments. For this work, 1087 images of *Podocyrtis* species divided into 8 classes from the most abundant *Lampterium* and *Podocyrtoges* lineages was used. Each image taken on one field of view (FOV) was taken on several focal points and stacked in Helicon Focus 7. Stacked images were then segmented using ImageJ which also transformed the images into 8-bit black and white images with reverse colors, so that the background appeared black and the radiolarians white. The type of neural network being used was deep learning Keras convolutional layers implemented into Nengo, a novel spiking neural network, that closely imitates the biological brain and is highly flexible and extensible. The dataset consisting of the images was divided into a training set consisting of 80% of the images and a validation set with the remaining 20%. Our preliminary results show a classification accuracy of about 75-80 percent, which is promising because it indicates that the neural network works and can read common pattern occurring within and between different classes from the training dataset.

Mots-Clés : Radiolarians, Podocyrtis, Middle Eocene, classification, Artificial Intelligence, Nengo, Spiking neural network

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.