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Nadia Aly, Daniel McGibney and **Daniel Vasiliu**. *Image Classification of Plankton Data
Using Convolutional Neural Networks*.

Plankton are very important for the balance of the food cycle in our ecosystem. It's critical role make it necessary to monitor its population. Nevertheless, the traditional ways to monitor the population by detecting the plankton images taken by underwater camera with human eyes are both inefficient and error-prone. In this presentation, we present an effective machine learning algorithm to automate the process of monitoring the plankton population by classifying images of different plankton.

Our methodology adopts the typical deep learning pipeline. We use several image transformation techniques to artificially increase the amount of image data. Also, we use Restricted Boltzmann Machine to pre-train the original data. Next, Convolutional Neural Networks (CNN) is adopted to train the image data. Finally, we attempt several different ensemble learning schemes to combine different models and increase the predicting power with hyper-parameters chosen by cross-validation. By carefully extracting information with a variety of unsupervised deep learning algorithms and semi-supervised learning algorithms, we create a hybrid model with strong predictive power and significantly lower misclassification rate than popular algorithms such as random forest. (Received September 22, 2015)