

Abstract

The goal of our research is to determine whether machine learning can predict the porosity factor to 3D construct the internal structure of a porous object such as a bone. This is valuable as there are many fields that require porous models to be accurately represented such as in computer graphics, to simulate objects in a more precise way; to reconstruct synthetic soils to optimise plant growth; in the medical area to 3D print prosthetics to cure bone tumors. There is a high necessity of large datasets for machine learning algorithms to work. Therefore our first step was to find a large enough data set. This consisted of ct-scans of sick, healthy and transplanted mice tibia bone cross-sections , then we processed the images in order to calculate the porosity factor and labelled each image depending on the porosity factor and health factor. To expand our dataset we modified the images by flipping, translating, rotating them and varied the brightness on them. The next step was to train the networks, one that would recognise the porosity of a bone and another that would recognise the healthiness of a bone. We tweaked the neural network values until we were satisfied with the recognition accuracy. Finally we show how good the machine learning algorithm has predicted successfully the porosity factor of an object and its healthiness.