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Machine Learning 2018: Deep learning: An application of machine learning to classify images- Aisha Al Owais-Sharjah Center for Astronomy and Space Sciences

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Living in the 21st century, mankind???s most powerful weapon is technology. The field of technology we have an interest in is computing, specifically AI (AI). As the name suggests, AI is about turning devices into intelligent agents that take actions supported the environment they perceive. They are also flexible in terms of adjusting their goal- what they're meant to try to to also as adjusting their actions counting on its changing environment. What makes AI agents peculiar is their ability to learn and remember from their mistakes. Furthermore, Machine Learning (ML) is one of AI???s applications that enable systems to find out automatically, improve through experience and adjust its actions without human intervention. This takes us to Deep Learning (DL), a replacement subfield of ML concerned with algorithms inspired by the structure and performance of the human???s brain called artificial neural networks. It has networks which are capable of learning data obtained from instructed or unlabeled data; therefore, it's also known Deep Neural Network (DNN). All those terms lead us to what we are mostly interested in, Convolutional Neural Networks (CNNs), which is a deep neural network that is particularly wall-adapted to classify images, in our case to classify images of meteorites. Image classification is a supervised learning problem: define a set of target classes (objects to identify in images), and train a model to recognize them using labeled example photos. Early computer vision models relied on raw pixel data as the input to the model. However, as shown in Figure 2, raw pixel data alone doesn't provide a sufficiently stable representation to encompass the myriad variations of an object as captured in an image. The position of the object, background behind the object, ambient lighting, camera angle, and camera focus all can produce fluctuation in raw pixel data; these differences are significant enough that they cannot be corrected for by taking weighted averages of pixel RGB values. To model objects more flexibly, classic computer vision models added new features derived from pixel data, such as color histograms, textures, and shapes. The downside of this approach was that feature engineering became a real burden, as there were so many inputs to tweak. For a cat classifier, which colors were most relevant? How flexible should the shape definitions be? Because features needed to be tuned so precisely, building robust models was quite challenging, and accuracy suffered. Self-driving cars are a great example to understand where image classification is used in the real-world. To enable autonomous driving, we can build an image classification model that recognizes various objects, such as vehicles, people, moving objects, etc. on the road. We'll see a couple more use cases later in this article but there are plenty more applications around us. Use the comments section below the article to let me know what potential use cases you can come with up! Data is gold as far as deep learning models are concerned. Your image classification model has a far better chance of performing well if you have a good amount of images in the training set. Also, the shape of the data varies according to the architecture/framework that we use.

Biography :

Aisha Al Owais has completed her BSc in Computer Science from the College of Engineering at the American University of Sharjah. She is working as a Research Assistant in the Meteorites Center at the Sharjah Center for Astronomy and Space Sciences.

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