

Summary:

This paper mainly focus on the three major aspects:

Mechanics of deep learning:

Data gathering is one of most important steps in deep learning. The data gathered should be diverse and error free. Data augmentation can make data diverse but we need to make sure that this process does not add error in data.

Building a model is next step after gathering data. Various frameworks gives advantages like using GPU, computing gradients, hyperparameter tuning, calculating performance metrics.

Overfitting and underfitting (bias-variance tradeoff) is helpful for selecting best architectural feature for training the model.

Transfer learning can be used in case of small datasets. This requires pre trained models. We can not make substantial changes in case of transfer learning.

Biological Applications of deep learning:

Deep learning is applicable in image classification, image segmentation, object track-ing, and augmented microscopy.

Image classification is assigning meaningful information/label to an image. Deep-learning-based image classifiers can accurately interpret changes in cell morphology in imaging-based high-throughput screening.

Image segmentation involves partitioning image in several part and identifyinPg specifics in the image. Identifying cell from a microscopic image is an application in biological field. Semantic segmentation and instance segmentation are the two major parts of image segmentation.

Object tracking involves task of following images in series of time-lapse image. This consist of two task object detection and object tracking. Centroid of an object can be used as a point to track that object in image. To get good results in object tracking image segmentation can be used to detect object in an image. Then relevant training data can be used to track the image.

Augmented microscopy is finding the hidden information from the image. Image denoising, to improve image resolution can be considered as one of the application of augmented microscopy.

Future steps:

Need to make large curated datasets which cover need of most life scientist.

Crowdsourcing can help to find the solutions of many problems and analyze frequent errors.

Existing work can be extended to wider range of application like segmentation should work in 2D and 3D tissues for multiple subcellular structures.