## **Assignment(Day-43:13-7-2020)**

Submit a document with brief answers to the following questions.

1. **What is transfer learning?**

**Transfer learning** make use of the knowledge gained while solving one problem and applying it to a different but related problem.

Transfer learning (TL) is a research problem in machine learning (ML) that focuses on storing knowledge gained while solving one problem and applying it to a different but related problem.

For example, knowledge gained while learning to recognize cars can be used to some extent to recognize trucks.

## **Pre-Training :**

When we train the network on a **large dataset(for example: ImageNet)** , we train all the parameters of the neural network and therefore the model is learned. It may take hours on your GPU.

## ****Fine Tuning :****

We can give the new dataset to fine tune the pre-trained CNN. Consider that the new dataset is almost similar to the orginal dataset used for pre-training. Since the new dataset is similar, the same weights can be used for extracting the features from the new dataset.

1. If the new dataset is very small, it’s better to train only the final layers of the network to avoid overfitting, keeping all other layers fixed. So remove the final layers of the pre-trained network. Add new layers .**Retrain only the new layers.**
2. **If the new dataset is very much large, retrain the whole network**with initial weights from the pretrained model.
3. **What is a pretrained model?**

Simply put, a pre-trained model is a model created by someone else to solve a similar problem. Instead of building a model from scratch to solve a similar problem, you use the model trained on other problems as a starting point.

For example, if you want to build a self learning car. You can spend years to build a decent image recognition algorithm from scratch or you can take an inception model (a pre-trained model) from Google which was built on ImageNet data to identify images in those pictures.

A pre-trained model may not be 100% accurate in your application, but it saves huge efforts required to reinvent the wheel. Let me show this to you with a recent example.

1. **What is imagenet database? How many images and classes are there in that data?**
2. **ImageNet :** The ImageNet project is a large visual database designed for use in visual object recognition software research.
3. More than 14 million images have been hand-annotated by the project to indicate what objects are pictured and in at least one million of the images, bounding boxes are also provided.
4. The Tiny ImageNet dataset has 100,000 images across 200 classes. Each class has 500 training images, 50 validation images, and 50 test images.
5. **What are the different pretrained models available on imagenet?**

There are many models such as AlexNet, VGGNet, Inception, ResNet, Xception and many more which we can choose from, for our own task.

Apart from the ILSVRC winners, many research groups also share their models which they have trained for similar tasks, e.g, MobileNet, SqueezeNet etc.

1. VGG16,
2. InceptionV3,
3. ResNet,
4. MobileNet,
5. Xception,
6. InceptionResNetV2