

BOĞAZİÇİ UNIVERSITY

CMPE 492

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# REPORT

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WEEK 2

BARAN DENİZ KORKMAZ

DOĞUKAN KALKAN

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# 1 Weekly Summary

## 1.1 Work Done

### 1.1.1 Transfer Learning

We have completed the general implementation of a deep model using transfer learning. The code architecture includes the following stages which are essential for any machine learning project: Importing the Data, Creating and Training the Imported Model, Reevaluating after Fine Tuning, Making Predictions for Unseen Data. The pretrained model used for transfer learning is **VGG19** currently. At this stage, we trained the model with a private dataset of 2 classes including valid and non-valid electric meter images.

You can see the implementation in our GitHub repository from the link below. You can also check the file **log.txt** to see the console output during training.:

<https://github.com/barandenizkorkmaz/DeepFake-Detection/tree/master/Deliverables/Week%202/Transfer%20Learning>

### 1.1.2 GPU

As we explained in Report 1, we needed a powerful GPU to train our model and test it. We, naturally, cannot afford to buy a GPU, so at this point Cloud Computing comes in handy. There are several choices available to us. The two of the choices are the best for us, namely Google Cloud and Amazon Web Services. Both options allow us to use their services for free for a limited amount of time. However, dealing with AWS and setting it up for our work seems very difficult for us as we have never experienced Cloud Computing before. Thus, we agreed on Google Cloud. We signed up for free trial, which is 300 dollars of credit. However, Google Cloud does not let its users to use any GPU they want. We have to request a quota increase and if our request is approved, we can use the amount of GPUs given to us. Upon a request, we immediately got denied. After reaching out to the Google Cloud Team, they directed us to another team that has the authority to give us a quota increase. Yet, at the moment, we are still waiting for a reply from them.

### 1.1.3 Dataset

As approved in previous meeting, we have requested for access permission for **FaceForensics++** dataset. The authorities have granted our access for the dataset by an e-mail which provides the specifications for accessing the dataset.

### 1.1.4 Deep Learning: Ian Goodfellow

We have completed the chapter 6 in the textbook Deep Learning by Ian Goodfellow, et al.

## 1.2 Learning Outcomes

### 1.2.1 Transfer Learning

- We analyzed the architecture of VGG-19. Analyzing the architecture of complex models gives an essential insight to develop such models in the future.
- We learned how to modify a model architecture to adapt into our own problem.
- We analyzed the effect of fine tuning.

### 1.2.2 GPU

The Google Cloud give us several options for GPUs. Some GPUs are very high quality and thus expensive. Since we only have limited amount of credit, we decided on NVIDIA Tesla P4. The cost to train ratio is not high and the price is affordable.

### 1.2.3 Deep Learning: Ian Goodfellow

The chapter 6 describes the basic foundation of deep learning including:

- Model Architecture
- Gradient-Based Learning including Cost Functions and Output Units
- Back-Propagation Algorithms

## 2 Challenges

### 2.1 Transfer Learning

The FaceNet network was not hard to import, but we could not adjust the output layers of model to adapt into our problem which was a binary classification problem. We have spent some considerable time on solving this problem, however we have failed. We will try to fix this issue again.

### 2.2 GPU

As we explained above, we are now currently unable to use Google Cloud due to quota restrictions. We are not given access to any of the GPUs yet even though we explained our situation in detail.

### 2.3 Dataset

The size of dataset is 2TB, which implies that the average size of images is approximately 1MB. The size of dataset makes it much harder to download, modify and later upload into the cloud to use in training by GPU instance.

### 3 Questions

We have no questions related to the studies of current week.

### 4 What's Next?: Upcoming Week

1. We will configure the GPU instance to utilize in our implementations.
2. We will download the dataset, arrange it to utilize, and upload into the cloud to use in model training. As our internet speed is highly low, we are planning to ask help from our colleagues with much better internet connection.
3. We will try to use FaceNet in transfer learning.
4. After the GPU configurations are handled, we will train the following implementations using GPU:
  - MNIST GANs of the Previous Week
  - Transfer Learning Using VGG-19
5. We will try to complete the other chapters in the textbook Deep Learning, Ian Goodfellow. We determined the following chapters to build a basic foundation of deep learning:
  - Chapter 7: Regularization for Deep Learning
  - Chapter 8: Optimization for Training Deep Models
  - Chapter 9: Convolutional Networks
  - Chapter 10: Sequence Modeling: Recurrent and Recursive Nets (**Optional**)