DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VIII Semester Project

MONTHLY PROGRESS REPORT - II

Batch No.	**35**	
Title of the project:	**IMAGE REGENERATION USING GENERATIVE MODELS**	
Team members:	**Abhijith C.**	**1MV14CS004**
	Raghava G. Dhanya	**1MV14CS077**
	Shashank S.	**1MV14CS131**
Name of the Guide:	**Sushila Shidnal**	
Duration:	**From March Week 1 to April Week 1**	

Details Of Work Carried Out:

On week 3 of march we were able to implement a CapsNet based binary classifier based on Geoffrey Hinton *et al.*[1]. On week 4 of march we tried to create a CapsNet based Generator, We encountered a problem, we were not able to invert the dynamic routing in CapsNet to reverse the architecture for Generator.

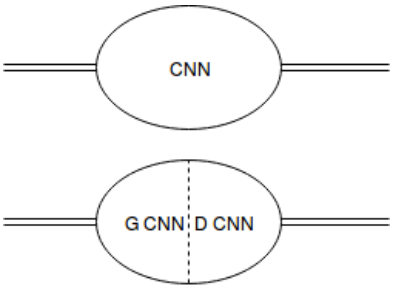

Figure 1: A normal capsule vs our proposed capsule

After considering multiple alternatives, We came up with a new architecture for Generator using CapsNet. This architecture is based on using the knowledge of dynamic routing from the Discriminator to perform dynamic routing in Generator. In a general CapsNet each capsule contains convolutional network, We can see these as a small Convolutional Neural Network(CNN). In a DCGAN there are two DCNN working in adversarial fashion. We propose an architecture for Capsule generator in figure 1 where each of the capsule will contain a small GAN having both generator and discriminator in it. Generator will be inactive while discriminator is learning, when generator is learning it remembers the dynamic routing from the discriminator and uses it to find the higher level capsule to which it needs to route the generated data. The higher level capsule generator uses this as their noise input to generate the Image.

The next step in the process was to figure out the mathematics for the training of the CapsuleGAN. We have come up with few methods and we will be implementing these methods and the proposed architecture and compare the results the state of the art GAN's in the following weeks.

[1]Sara Sabour, Nicholas Frosst, and Geoffrey E Hinton. Dynamic routing between capsules. In I. Guyon, U. V. Luxburg, S. Bengio, H. Wallach, R. Fergus, S. Vishwanathan, and R. Garnett, editors, Advances in Neural Information Processing Systems 30, pages 3856–3866. Curran Associates, Inc., 2017.

Time-line:

[Completed] Feb Week 3: Basic GAN
Implement a vanilla GAN with MNIST data.

[Completed] Feb Week 4: Basic CapsNet
Implement a CapsNet Classifier on MNIST data.

[Completed] Mar Week 3: Discriminator using CapsNet
Implement a binary CapsNet Classifier and train it as discriminator.

[Completed] Mar Week 4: GAN with CapsNet Discriminator
Plug the CapsNet discriminator to GAN.

[Unsuccessful] Apr Week 1: Generator using CapsNet
Try to implement CapsNet based generator.

Apr Week 4: Fully CapsNet based GAN
Plug the CapsNet based generator into GAN to create a fully CapsNet based GAN.

May Week 1: Training and testing
Train and test the model on face dataset.Optimize the model,Tune the hyper-parameters.

May Week 2: Compare results and continue testing
Compare the resulting model with current state of the art models.

Head of the Department

Project Guide **Project Coordinator**