

Title: Open-Set Object Recognition Techniques using Deep Neural Network for Robotic applications

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Keyword(s): Deep Neural Network  
Machine Learning

Subject(s): Variational Autoencoder  
Reconstruction Loss

**Abstract:** Open-Set recognition problem is a well known problem in the field of autonomous systems. There are many state of art works that have been carried out for this problem. In our work, after performing detail analysis of the existing work based on reconstruction loss and distance based loss, we have made improvement in the existing work. we have made contributions in both neural network architecture as well as in the existing cost function. From the neural network architecture perspective, we have added the probabilistic ladder type decoder in the existing neural network and from cost function perspective, we have added reconstruction loss and KL divergence loss terms in the existing cost function. We have compared our work with the existing work and we see that our work is performing better in two cases and for remaining cases our work is giving similar results to the existing work. We have used CIFAR10, CIFAR+10, CIFAR+50, CIFAR100, MNIST and SVHN Dataset for comparing our work performance to the existing work. We have plotted Area Under the Receiver Operating characteristics together for our work and the existing work for each dataset separately.

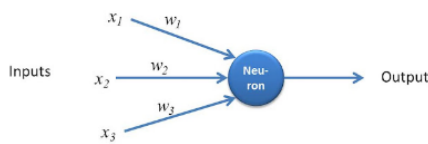
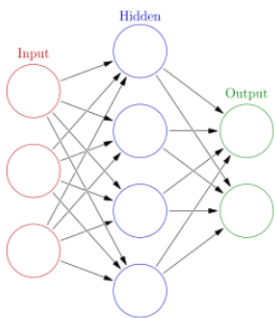


Figure 2.1: Simple artificial neural network

Figure 2.2: Perceptron

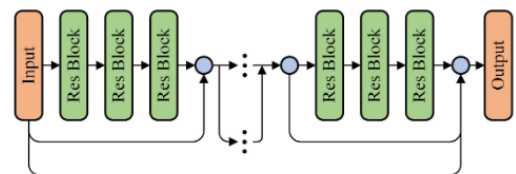


Figure 2.6: Schematic of ResNet made up of Residual Block

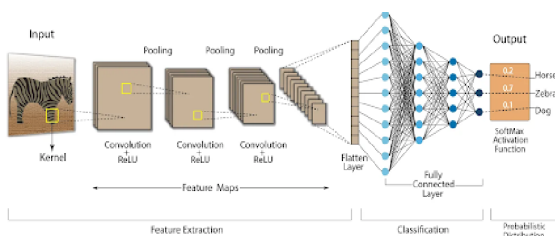


Figure 2.4: Utilising a convolutional neural network for image classification

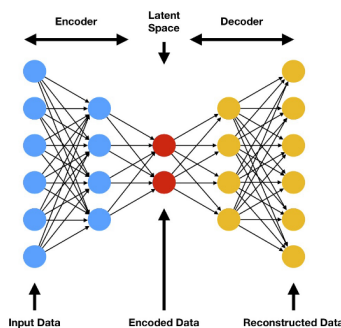


Figure 2.9: Schematic of Autoencoder

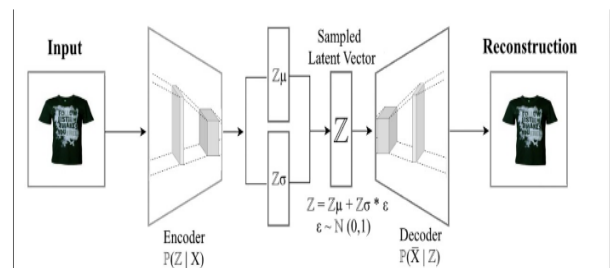


Figure 2.11: Sampling in Variational Autoencoder