This paper proposes a convolutional neural network with generative properties called Introspective Convolutional Networks (ICN). The goal is to improve classification rates with the same number of training samples. The generative model produces pseudo negative samples that the model that trains on to improve classification accuracy.

There are several existing approaches to solve the problem of not having enough training data. For example, bootstrapping or GANs. Bootstrapping uses data that is already available so it is fundamentally different from the ICN method proposed. GANs can generate new data from existing datasets but it differs from the ICN method described in the paper in several ways. For example GAN is an unsupervised technique to generate more of the sample dataset whereas ICN is a supervised technique that produces more of the negative sample. GAN also uses two models, a generator and a discriminator whereas ICN uses only one model to generate samples.

In ICN, there is a learned discriminative classifier that generates is own sample within the model and the retrains on the generated data. This means it is a single model that has generative model and a classification model within itself. The generator produces more and more pseudo-negative samples, and as the model iteratively trains on this larger training set, the decision boundaries for classification tighten and increase the models accuracy rate.

The author uses three standard benchmark datasets MNIST, DIFAR-10 and SVHN and compares the ICN model proposed with traditional conventional neural network models. The results show a distinct reduction in error rates for classification. The error rates are more distinctly lower when the number of training sample are low.