Paper: **A Genetic Programming Approach to Designing Convolutional Neural Network Architecture**

**Introduction**

**No of Paragraphs: 4**

**Paragraph no 1:**

Deep learning shows good performance on image recognition, speech recognition etc. done by using CNNN architecture that consist several convolutions, pooling and fully connected layers.

**Paragraph no 2:**

Straight forward approach in neural network is to deal with architecture design as a hyper-parameter optimization problem.

**Paragraph no 3:**

Direct and indirect are two types of encoding scheme for network representation. Almost all traditional approaches optimize the number and connectivity of low level neurons.

**Paragraph no 4:**

**CNN** architecture designed based on genetic programming. Here adopt high functionality modules, such as convolutional block.

**Related work**

**Hyper-parameter optimization**

**No of paragraphs: 2**

**Paragraph no 1:**

There some hyper-parameter tuning methods. Evolutionary algorithms also applied to hyper-parameters optimization problem. Bayesian optimization maintains surrogate model learned by using previously evaluated solution. To reduce computational cost some methods are used.

**Paragraph no 2:**

Hyper-parameter optimization approach often tunes no. of layers, neurons and types of activation functions.

**Evolutionary neural network**

**No of paragraphs: 3**

**Paragraph no 1:**

Evolutionary algorithms have been used to optimize neural network architecture so far.

**Paragraph no 2:**

DPPNs proposed for optimizing the weights of de-noising auto-encoder that is differentiable version of the **CPPNs**.

**Paragraph no 3:**

Hyper NEAT have not achieved competitive performance compared with the state-of-the-art method.

**Reinforcement learning approach**

**No of paragraphs: 2**

**Paragraph no 1:**

Reinforcement learning based method constructed the competition CNN architecture for image classification tasks. Some distributed systems are used.

**Paragraph no 2:**

State-of-art methods used indirect encoding scheme, while they use direct coding based on Cartesian genetic programming.