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| **Title:** Evolving Deep Convolutional Neural Networks by Variable-length Particle Swarm Optimization for Image Classiﬁcation  **Main author:** Bin Wang  **Year:** 2018  **Link:** <https://ieeexplore.ieee.org/abstract/document/8477735> |
| **Journal:** [IEEE Congress on Evolutionary Computation (CEC)](https://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=8466244)  **IF:** 8  **Pages:** 9 |
| **Structure of the paper**   1. Abstract 2. Introduction    * Goal      + Designing a new particle encoding scheme.      + Design a method to break the constraint of fixed length encoding.      + Purpose a fitness evaluation 3. Background    * CNN Architecture    * Particle Swarm Optimization    * Internet Protocol Address 4. The proposed Algorithm    * Algorithm Overview    * Particle Encoding Scheme    * Population Initialization    * Fitness Evaluation    * Update Particle with velocity clamping    * Best individual selection and decoding 5. Experiment Design    * Benchmark Datasets (MB, MRDBI, CS)    * Peer Competitors (RandNet, PCANet, SAA-3, LDANet, ScatNet)    * Parameter Settings 6. Result and Analysis.    * Overall Performance    * Evolved CNN Performance    * Visualization 7. Conclusion |
| **Detail of figures and plots**  **Regarding Training.**   1. Fig.5 shows the surface of CNNs accuracies and trajectory.   **Regarding CNNs Architecture**   1. Fig.1 An general architecture of the Convolutional Neural Network |
| **Tables**   * **Table-1**: THE PARAMETERS OF DIFFERENT TYPES OF CNN LAYERS CONVOLUTIONAL, POOLING, FULLY-CONNECTED AND DISABLED LAYER WITH AN EXAMPLE IN THE EXAMPLE COLUMN * **Table-2**: FOUR SUBNETS DISTRIBUTED TO THE THREE TYPES OF CNN LAYERS AND THE DISABLED LAYER * **Table-3:** AN EXAMPLE OF IP ADDRESSES - ONE FOR EACH TYPE OF CNN LAYERS * **Table-4:** Parameter List * **Table-5**: CLASSIFICATION ERRORS OF THE PROPOSED IPPSO METHOD AGAINST THE PEER COMPETITORS ON THE MB, MDRBI AND CS BENCHMARK DATASETS * **Table-6:** AN EVOLVED ARCHITECTURE FOR THE **MB** BENCHMARK * **Table-7:** AN EVOLVED ARCHITECTURE FOR THE **MDRBI** BENCHMARK * **Table-7:** AN EVOLVED ARCHITECTURE FOR THE **CS** BENCHMARK |
| **Experimental setup and experimentation**   * **Experiment-1:** MNIST Basic (MB) Dataset   + **Compared with:** State of the art CNNs   + **Outputs:** Error rates.   + **Output structure:** Tabular * **Experiment-2:** MDRBI Dataset   + **Compared with:** State of the art   + **Outputs:** Error rates   + **Output structure:** Tabular * **Experiment-2:** CS Dataset   + **Compared with:** State of the art   + **Outputs:** Error rates   + **Output structure:** Tabular |
| **A brief summary of the proposed work [one paragraph]**  In this paper the researchers have optimized the topology of the CNN using PSO the have almost optimized everything except for the weights. To counter the variable length problem, they have used IP address mapping. They have trained their neural nets with 3 benchmarks datasets. |
| **Critical review**  Why they did not optimize the weights of the convolutional filters as well? |
| **Any idea to upgrade the concept**  We can use Evolutionary algorithms for training weights as well along with all other parameters. |
| **Name five papers from references, you’d like to read next**   1. Exploring Convolutional Neural Network Structures and Optimization Techniques for Speech Recognition |
| **Name five papers from citations, you’d like to read next** |