

# Cellular Automata Learning and Prediction Model for Handwritten Pattern Recognition

A lot of effort has been made to improve the accuracy of handwritten pattern recognition systems. This effort ranges from better classifiers to ensemble of classifiers and from feature reduction to over-sampling. In this speech, I am going to present yet another ensemble learning architecture called "Cellular Automata Learning and Prediction" (CALP), for classification of handwritten patterns. It is based on the idea that every handwritten pattern is an array of living cells or organisms that both interact and are affected by one another. Since the cells impact one another and have the ability to die and reproduce, this analogy can be extended to growth and evolution. Thus, every pattern can grow and evolve.

The cellular automata (CA) are used to model this behavior as it has been used as a default model for various biological systems. This architecture allows the handwritten patterns to evolve or grow using various parameters that control how the cells interact with each other. Then these different evolved patterns are used to train independent classifiers which are then combined together to form an ensemble. The idea is to capture more variations in a handwritten data set than the typical standalone classifiers or their ensembles. The method is applied on various handwritten data sets using different classifiers and have shown to produce good results.

One major limitation of the proposed CALP model is that it is only applicable to binary images. This is because in this thesis CA is considered as a 2D grid consisting of cells with binary values. For future work, it would be interesting to extend CA beyond binary-valued cells to multi-valued cells. One benefit of this would be for example, that it would extend CALP to grayscale images.

## Biography

Aamir Wali has been teaching at the Department of Computer Science, FAST-National University of Computer and Emerging Sciences, Pakistan since 2004. He has a PhD in Computer Science from the same University. His areas of interest include font development, writing systems, machine learning, image processing, human computer interaction and virtual/augmented reality. His recent research is on combining evolution of data sets with pattern recognition, developing IT solutions for the disabled and applications in AR/VR.