Handwritten Character Recognition using Machine Learning Approach

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Abstract

Research in Handwritten character recognition(HCR) was started after 1980. After artificial intelligence came, accuracy of pattern recognition increased with use of applying machine learning algorithms. Manny researchers proposed their various works and achieve good accuracy. But, still it is an area under research to achieve higher accuracy and reduce the time complexity. This poster present new proposed approach for HCR system, that reduce computation and achieve good accuracy in less time with machine learning approach.

Keywords : Handwritten Character Recognition, Class Reduction, Machine Learning, SVM, ANN

Motivation

In our daily life, actually we are doing character recognition all the time. Like when reading someone else notes, sign-board or novel or reading books, etc. Then we match it with our past experience and memory, and based on that we react or take an action or infer some new things. So, this is our natural character recognition. Based on natural character recognition, other artificial recognition system are working.

Applications

- Digitization of handwritten record
- Application form reading and based on data entry
- Translation system - Recognize the unknown language and translate it in a known language [1]
- Bank cheques processing[2],[3]
- Signature verification
- Vehicle number plates detection[2],[3]
- Automatic pin code reading to postal mail[2],[3]

Literature Review

- Various FE techniques likes, chain code, zoning, Various gradient methods, HOG are vary popular.
- For the classification, various authors used Image processing techniques, and machine learning techniques. But after all, machine learning techniques are the batter then others.
- For dataset, many authors used own dataset and some of used CEDAR and NIST dataset.
- Some researchers get good accuracy but cost of time, and if time reduce then rate of accuracy compromised.

Problem Statement

Handwriting, every person have own and somehow it is always differ to other person's handwriting, there is no uniqueness. So, it make character recognition more difficult.

- Accuracy of character Recognition need to be improve.
- Time for character Recognition need to be reduce.

Goal

To develop the handwritten English characters recognition system that reduce the Computation and improve the Accuracy with the use of SVM and ANN machine learning technique.

Proposed Methodology

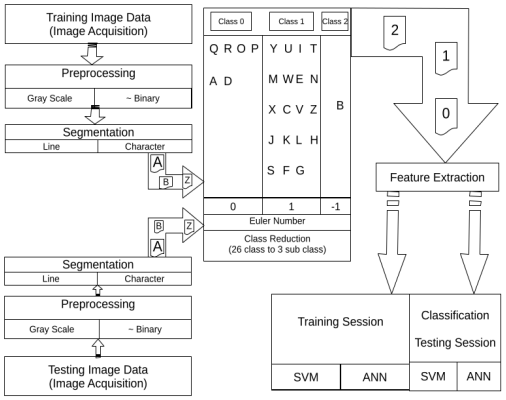

Figure : 1 Proposed System - Block Diagram

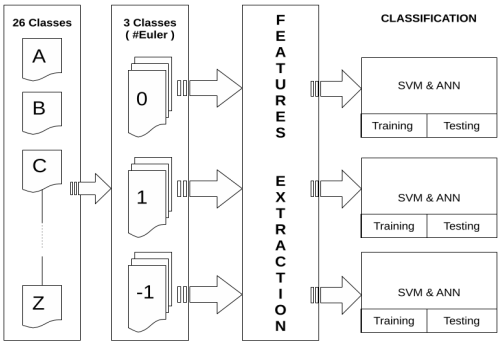

Figure : 2 Computation Reduction

Tools and Technology

- **Tools :** Matlab (R2014a)
- **OS :** Linux (Ubuntu 14.04.2 LTS)
- **Technology :** Matlab
- **Processor :** Intel Core i3 1st Gen
- **RAM :** 3 GB
- **Swap Memory :** 6.9 GB

Results & Analysis

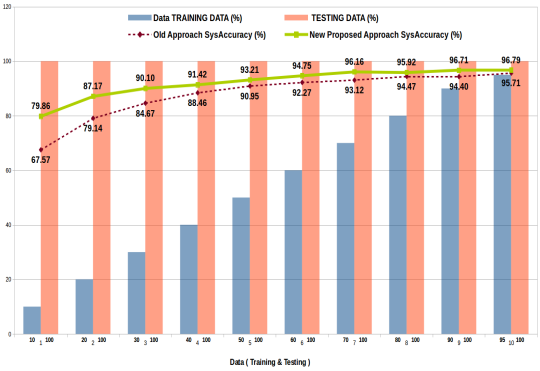

Figure : 3 Accuracy Parameter - SVM

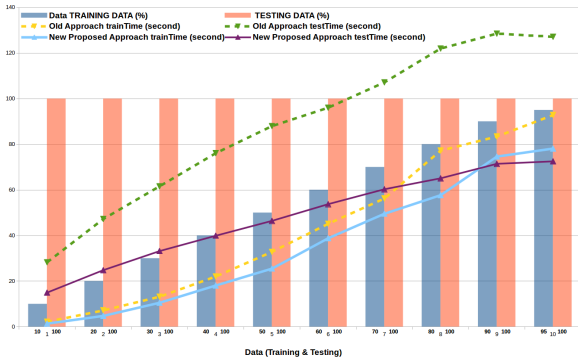

Figure : 4 Time Parameter - SVM

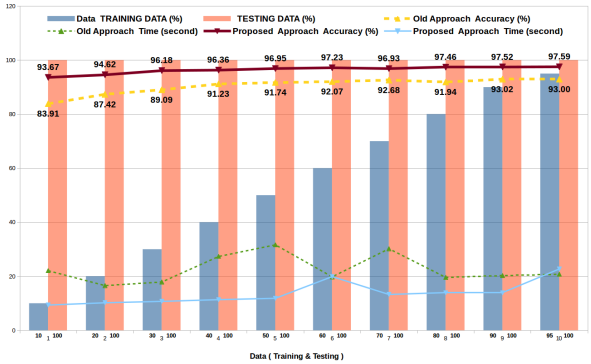

Figure : 5 Accuracy & Time Parameter - "trainscg" -ANN

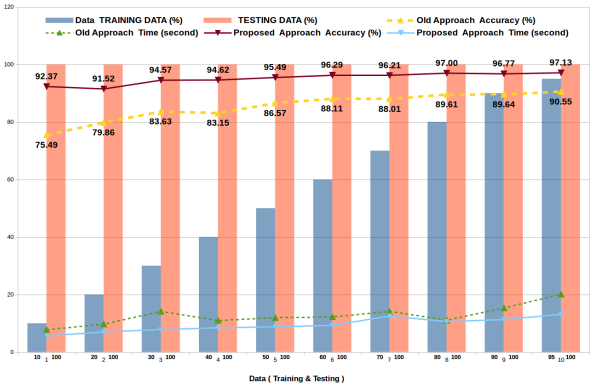

Figure : 6 Accuracy & Time Parameter - "trainrp" -ANN

Conclusion

Applying machine learning techniques in handwritten character recognition system increase the recognition accuracy and selection of good features reduce the time complexity of HCR system. All result show that proposed system quite good then conventional system approach. It take less time and gives overall good accuracy.

In future work, remove as possible as constraints and experiment again this novel approach with different handwritten dataset.

References

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