

Interpolation/Decimation Scheme for Size Normalization of Character Images

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Abstract. This work proposes an original interpolation/decimation scheme to perform size normalization of handwritten character images. The method has been tested with a RNN classifier, yielding good results.

Objective: To improve the performance of systems for handwritten character recognition.

Proposed scheme: Performs size normalization (scaling), by independently interpolating/decimating the rows and columns of the original character image by any scaling factor desired, integer or non-integer.

Tested interpolation/decimation algorithms:

1. Cubic Spline Interpolation, polynomial form [1], and decimation by block averaging (method proposed);
2. Cubic Spline Interpolation, polyphase network form [2], and decimation by block averaging (method proposed);
3. Yuceer normalization [3] (used for comparison).

Testing environment: Recurrent Neural Networks classifier: 80 cells for input and hidden layers and 10 output cells [4].

CENPARMI Database of handwritten characters used.

Results:

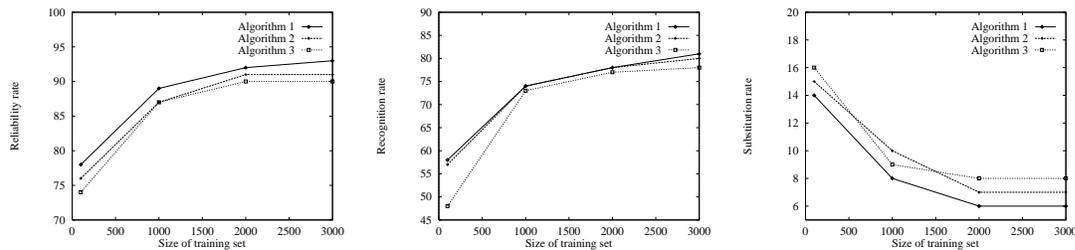


Figure 1: Reliability, recognition and substitution rates versus training set size.

Conclusions:

- Improves the performance of RNN classifiers.
- Polynomial form of cubic spline interpolation produces better results.
- Polyphase network form of cubic splines more adequate for real-time applications (low computational complexity).
- The proposed method deals with any scaling factors, integers and non-integers.

References:

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3. C. Yuceer and K. Oflazer. "A Rotation, Scaling and Translation Invariant Pattern Recognition". *Pattern Recognition*, 26(5):687-710, 1993.
4. S. -W. Lee and H. -H. Song. "A New Recurrent Neural-network Architecture for Visual Pattern Recognition". *IEEE Trans. on Neural Networks*, 8(2):331-339,1997.