

A Holistic word recognizer: work in progress

Handwriting Recognition

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June 5, 2007



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Introduction

- Roughly two paradigms for doing handwriting recognition [Steinherz et al., 1999, Vinciarelli, 2002]:
 - Segmentation-based
 - Holistic [Madhvanath et al., 2001]

Why choose the holistic approach?

- Problems with segmentation:
- Sayre's paradox: *To recognize a letter, one must know where it starts and where it ends, to isolate a letter, one must recognize it first.*

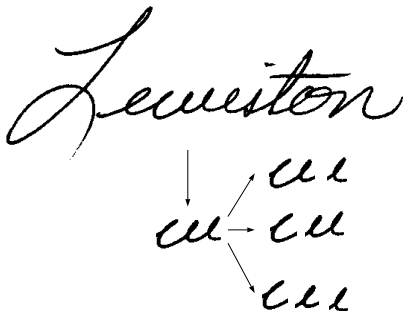
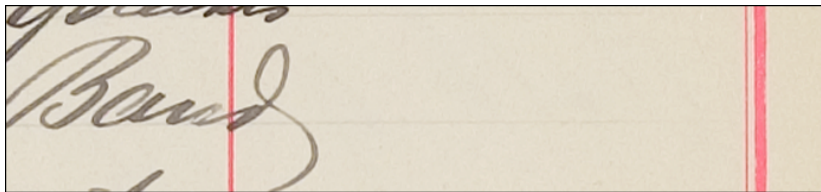


Figure: Image reproduced from: [Madhvanath et al., 2001]

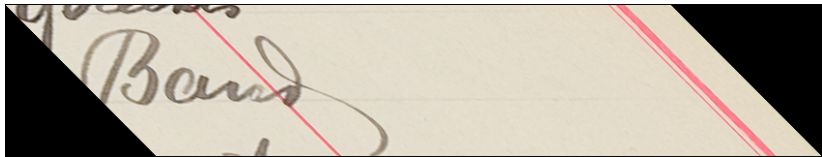
Why choose the holistic approach?

- Avoids 'the hard problem' by ignoring it
- Uses information that humans (probably) also use:
 - Global word form (i.e. ascenders/descenders)
 - Word superiority effect [Madhvanath et al., 2001]
- Holistic algorithms are often computationally efficient

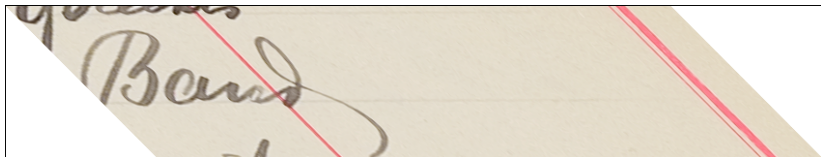
Preprocessing



Preprocessing



Preprocessing



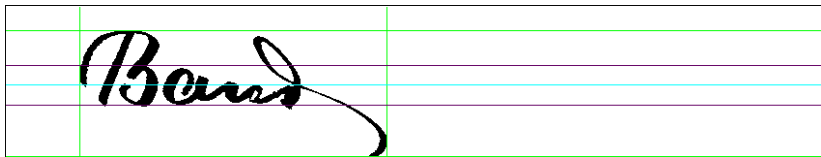
Preprocessing



Preprocessing



Preprocessing



Features

- Already in use:
 - Word length (pixels)
 - Word height (pixels)
 - Area (pixels)
- Planning to use:
 - Loops and holes
 - Ascenders
 - Descenders
 - Center line crossings
- Exploring the possibilities (inspiration:
[Lavrenko et al., 2004, Rath and Manmatha, 2003]):
 - Upper and lower projection

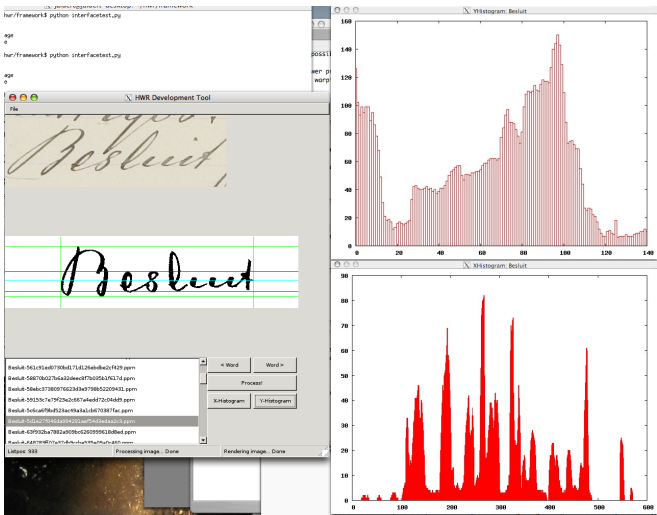
Training and Classification

- First transcribe the trainset to feature descriptions
- Transcribe the query word image
- Lexicon pruning (Constraint satisfaction)
- Some features require different approaches to compare than others (e.g. Levenshtein, Euclidean distance, Dynamic Time Warping)
- Different features will be weighted by their relative importance

Postprocessing

- Build a top 5 by using frequency information of the remaining words

GUI



Discussion

- Can't handle unseen words
- Lexicon has a fair amount of single-occurrence words (12.55% of 6821 training words)
- Risk of pruning away correct words
- No use of context information!

References I



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