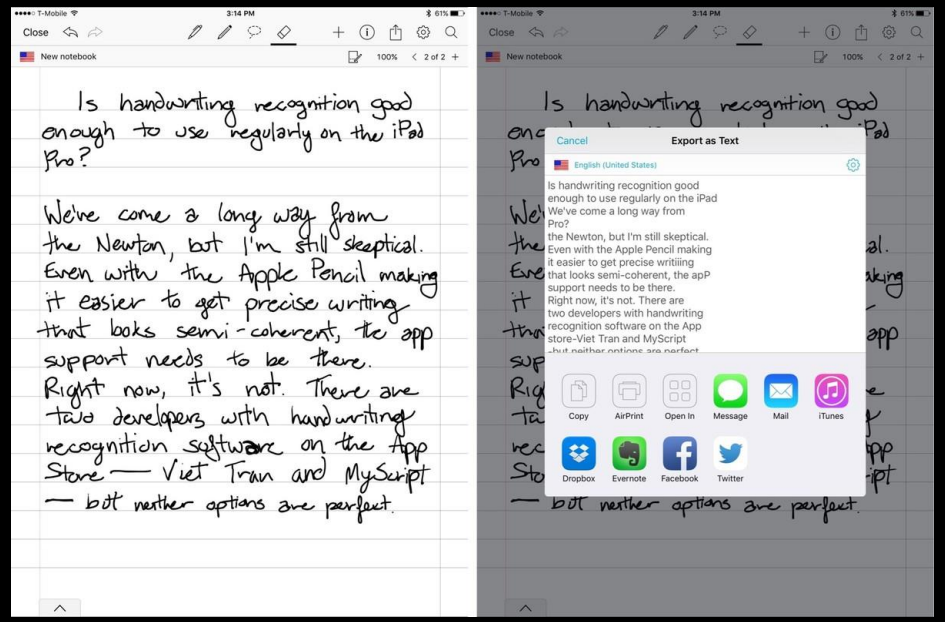
MULTILANGUAGE ON-LINE HANDWRITING RECOGNITION

Haoran Zhang

WHAT IS HANDWRITING RECOGNITION

- Handwriting recognition is the ability of a computer to receive and interpret intelligible handwritten input from sources such as paper documents, photographs, touch screens and other devices (Wikipedia)



ON-LINE?

- On-line recognition refers to methods and techniques dealing with the automatic processing of a message as it is written using a digitizer or an instrumental stylus that captures information about the pentip, position, velocity and acceleration as a function of time

OFF-LINE?

- Off-line recognition is just to recognize characters and words that is already written

CHALLENGES FOR ON-LINE HANDWRITING RECOGNITION

- 1. Strong variability in writing style
- 2. Ambiguity
- 3. Difficult to recognize thousands of characters
- 4. Handwriting recognize may be inaccurate because of the delayed input

STEPS TO HANDWRITING RECOGNITION

- 1. preprocessing
- 2. segmentation and search lattice creation
- 3. generation and scoring of character hypotheses
- 4. best path search in the resulting lattice

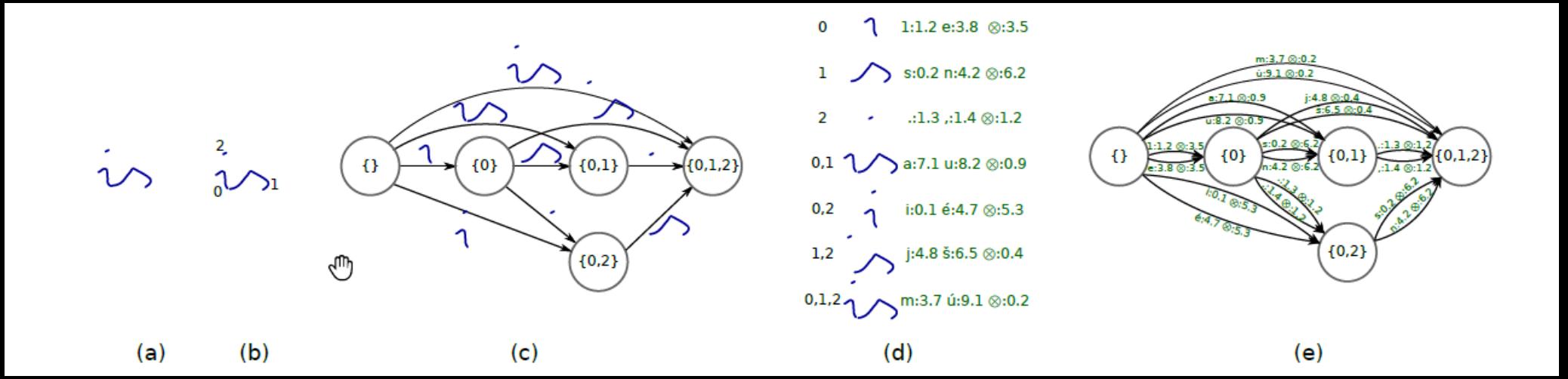
PREPROCESSING

- 1. resampling：length resampling
- 2. slop correction: adjust non horizontal and vertical strokes
  rotate and choose best score

- Advantages: efficient, flexible

SEARCH LATTICE CREATION

- 1. create segmentation lattice: cut points and scores
- 2. extract features
- 3. label the lattice: state machine



SEARCH FOR RESULT

- 1. ink-aligned beam search: consider all edges & calculate score on each node
- 2. search preceding text
- 3. pruning: reduce size of decision trees

TRAINING

- Training models
- Training segmenter
- Training feature wights
- Training data

WORKS BETTER!

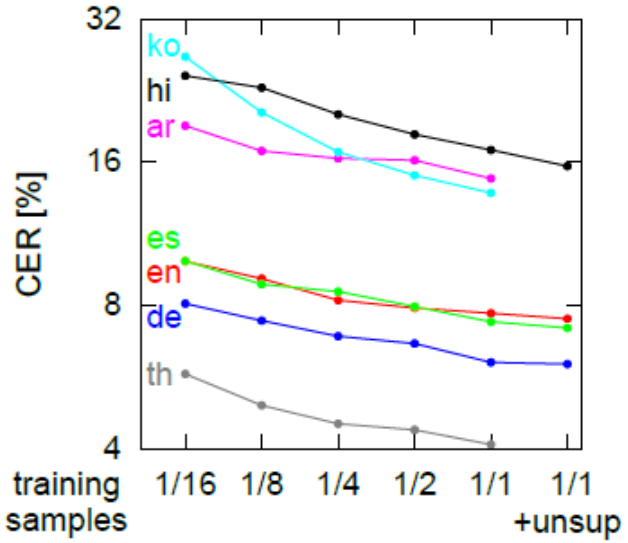


Fig. 6. Character error rates for our system with respect to the number of training samples used. Each point on the lines corresponds to doubling the training set. The point at the position "1/1 + unsup" corresponds to using the full set of labeled data along with a similar amount of unsupervised (self-labeled, unlabeled) data.

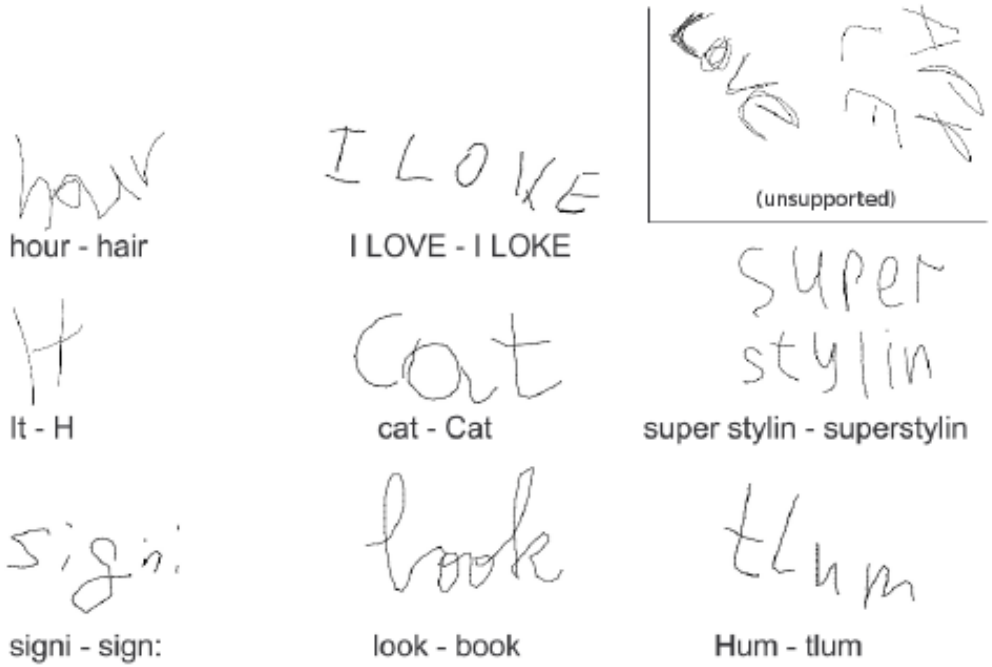


Fig. 7. Example errors. See text for details.

WHY BETTER?

- Time and position based: handles overlapping and delay
- Use MERT, a method for learning feature weights for machine translation
- Better pruning approaches: works better on less powerful device

- Add more features
- Different segmentation and decoding algorithms
- Machine learning

WORK CITATION

- https://en.wikipedia.org/wiki/Handwriting_recognition
- http://www.imore.com/i-want-handwriting-recognition-iphone-and-ipad-even-if-it-stinks
- http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7478642&tag=1