

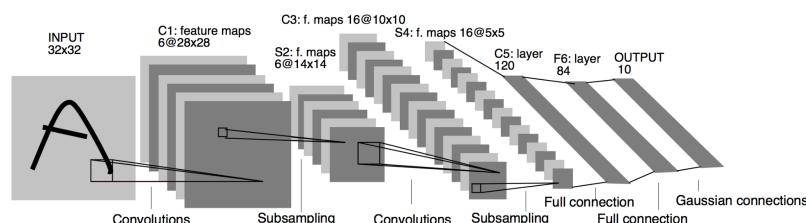
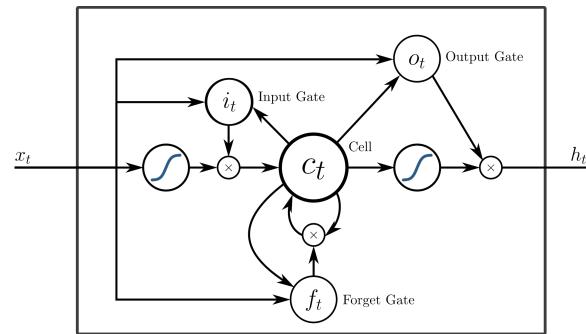
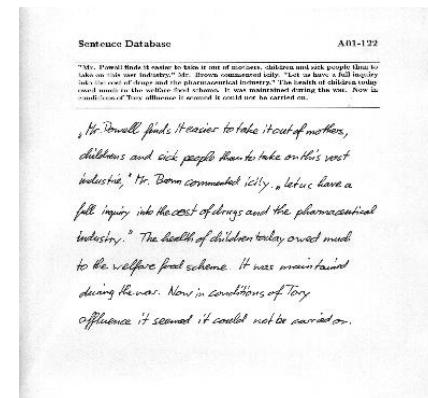
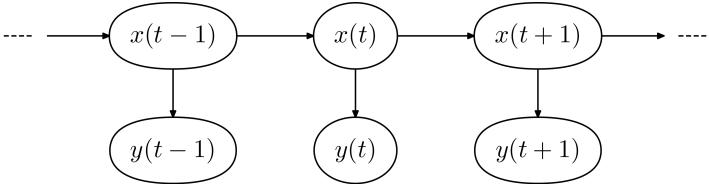


Offline Handwriting Recognition—Where we are and Where are we Going

Chris Tensmeyer | Research Scientist

#AdobeRemix
Jon Noorlander

Some Major Milestones



HMM

ANN-HMM

LSTM

MNIST
CNN

IAM

Deep Learning

Rimes

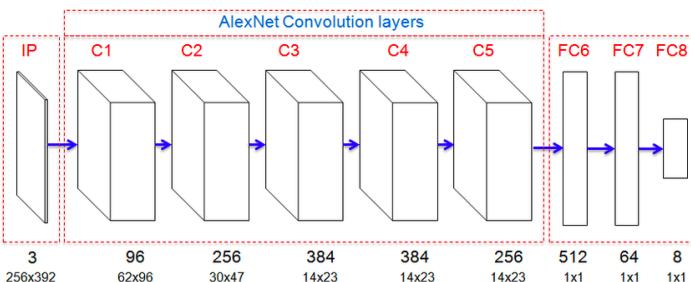


More Major Milestones

that they are either complicated with Injuries operating

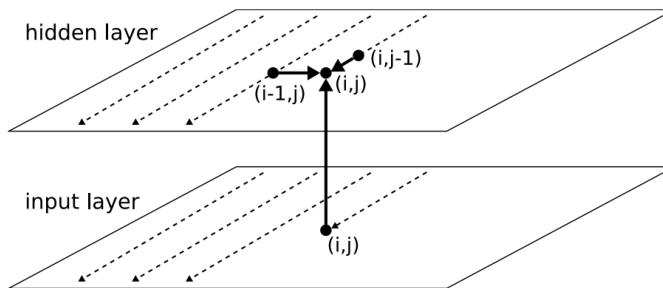
2012

AlexNet
MD-LSTM



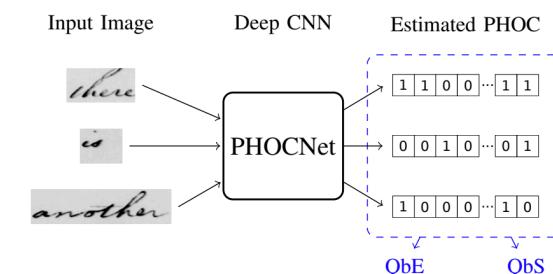
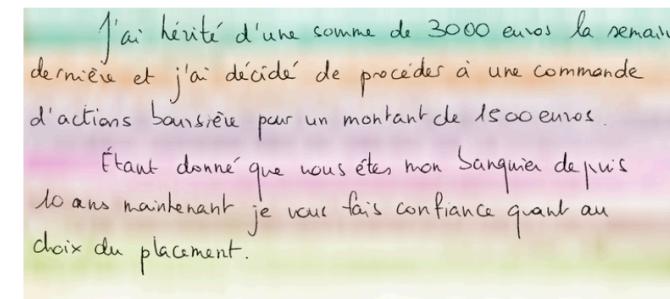
2014

RNN-LM
Bentham



2016

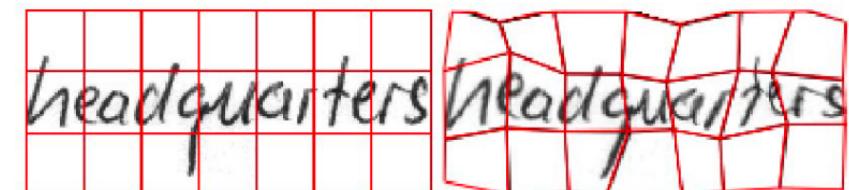
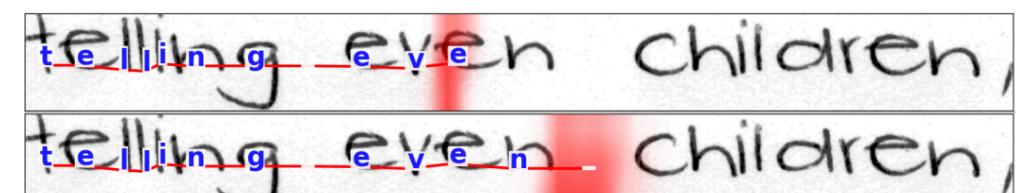
CNN-RNN
Attention
PHOC-Net



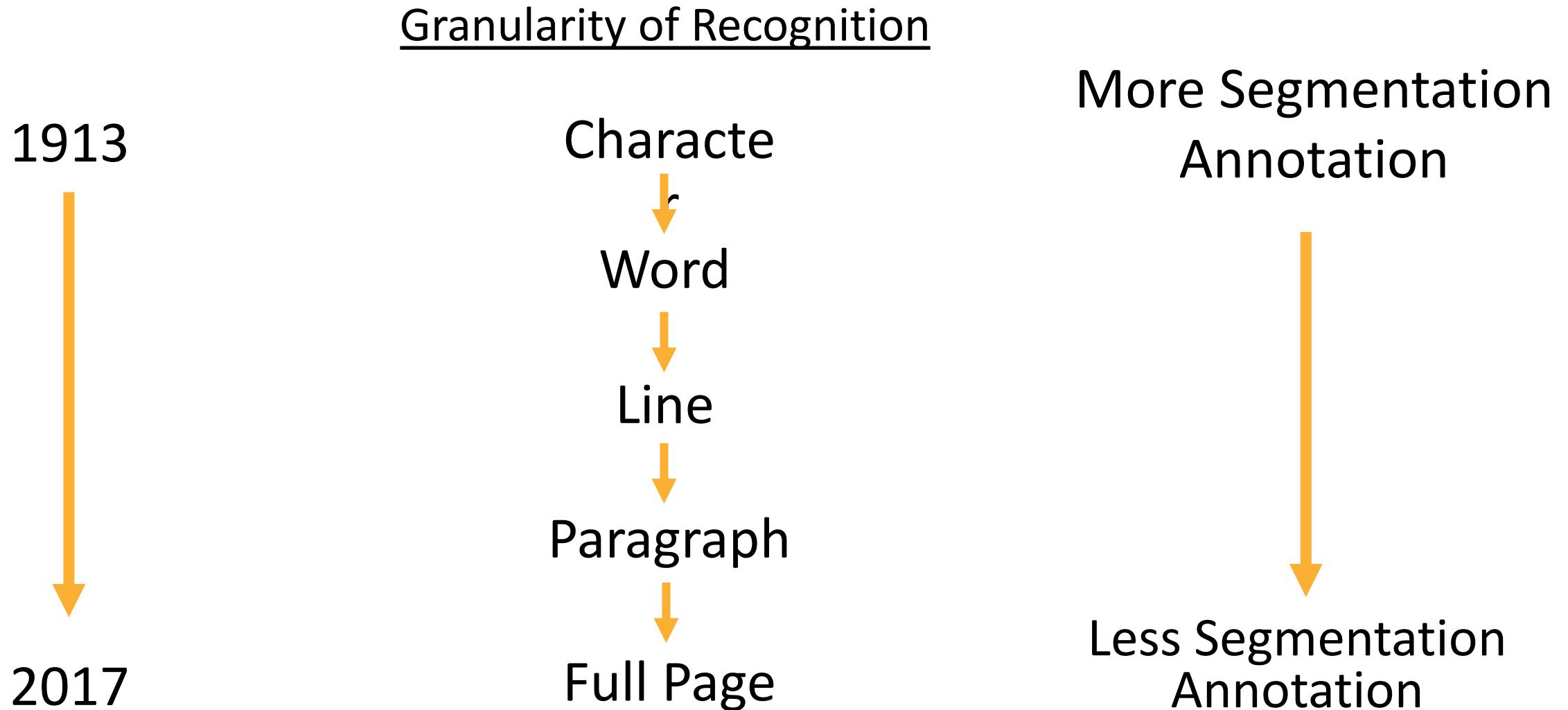
2017

Full Page
Data Aug.

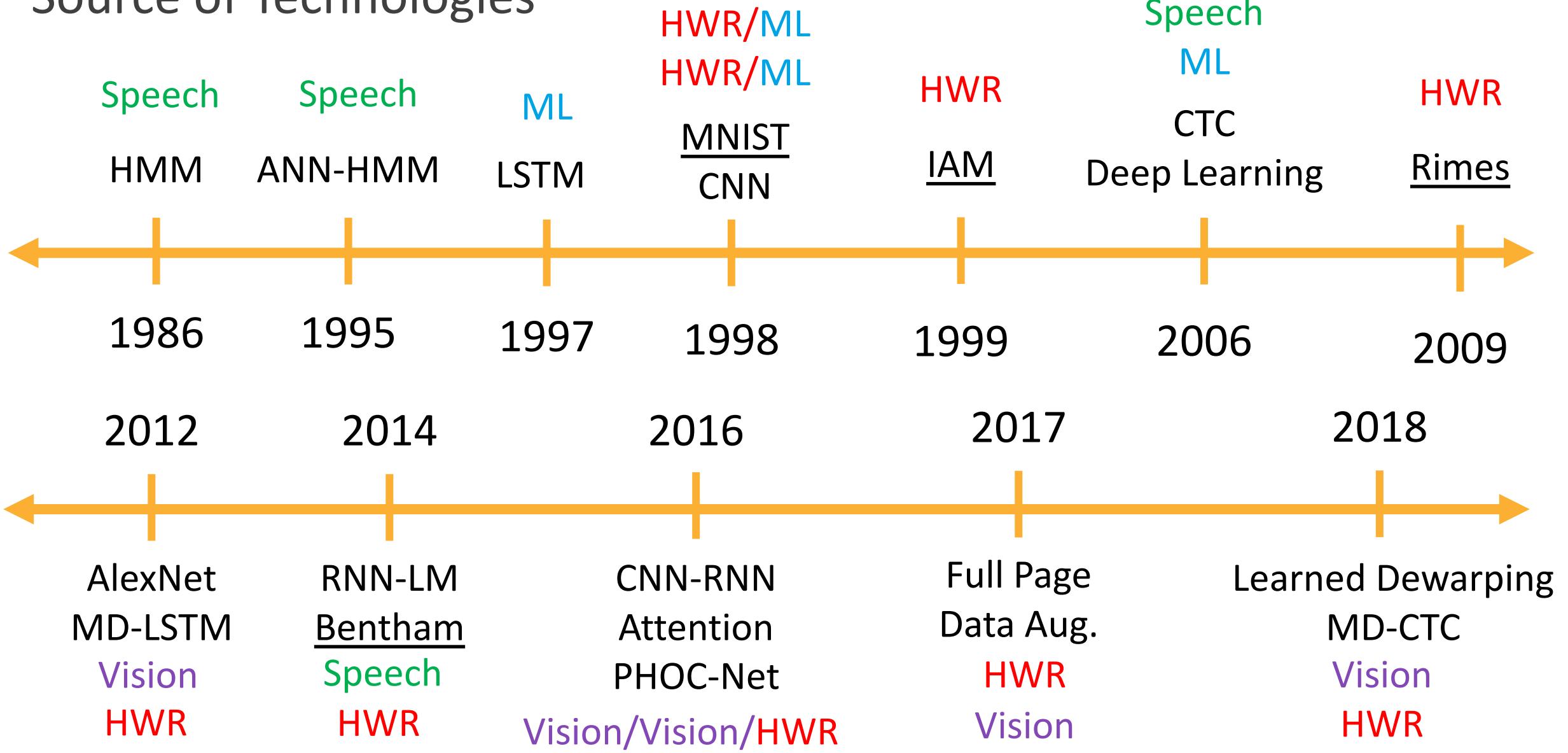
Learned Dewarping
MD-CTC

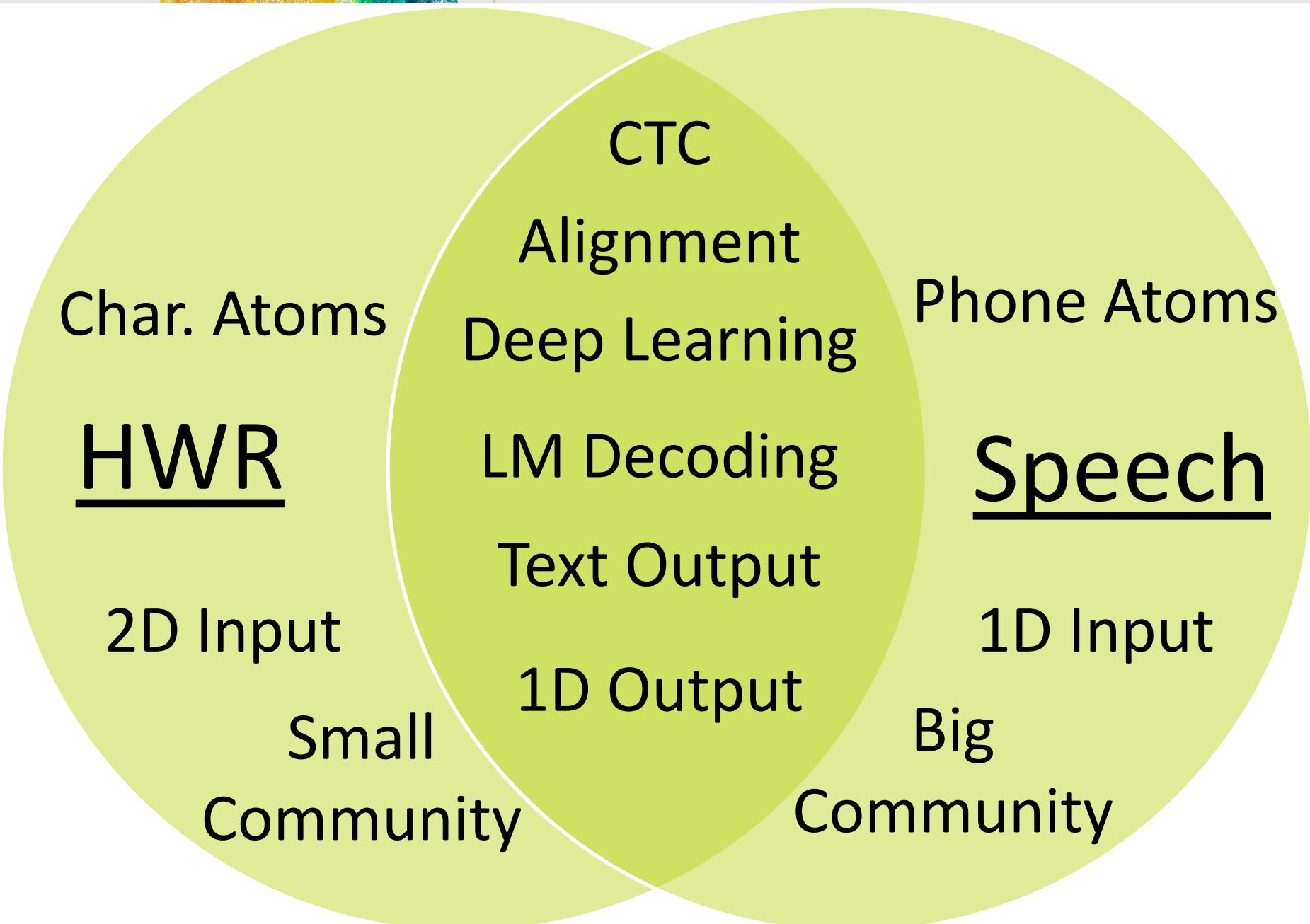


Observations



Source of Technologies



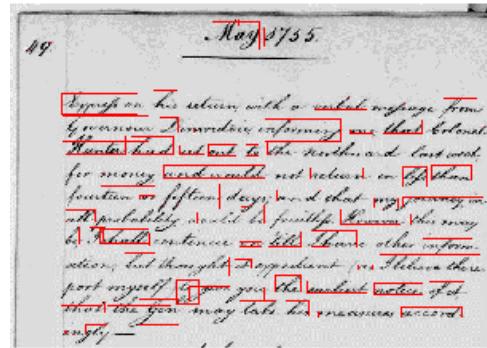


Future

Focus on *Unique* Aspects of HWR
Continue Borrowing for *Shared* Subtasks

Exploit Within-Page Similarity

Document



Word

Image

Extraction



Index

Clustering

Tagging

Indexing

1755: p.12, p.22, ...

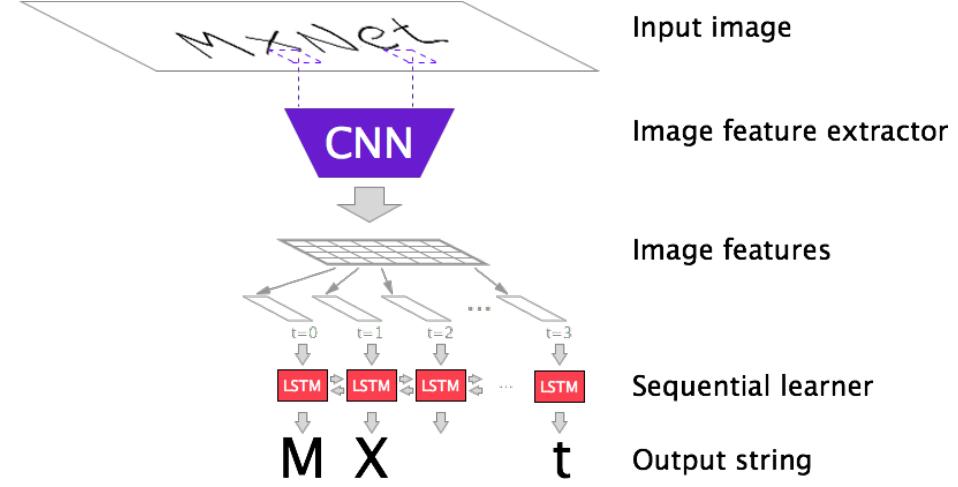
Express: p.12, p.14, ...

May: p.12, p.45, ...

Repeated Words have Similar Appearance



Monolithic Model



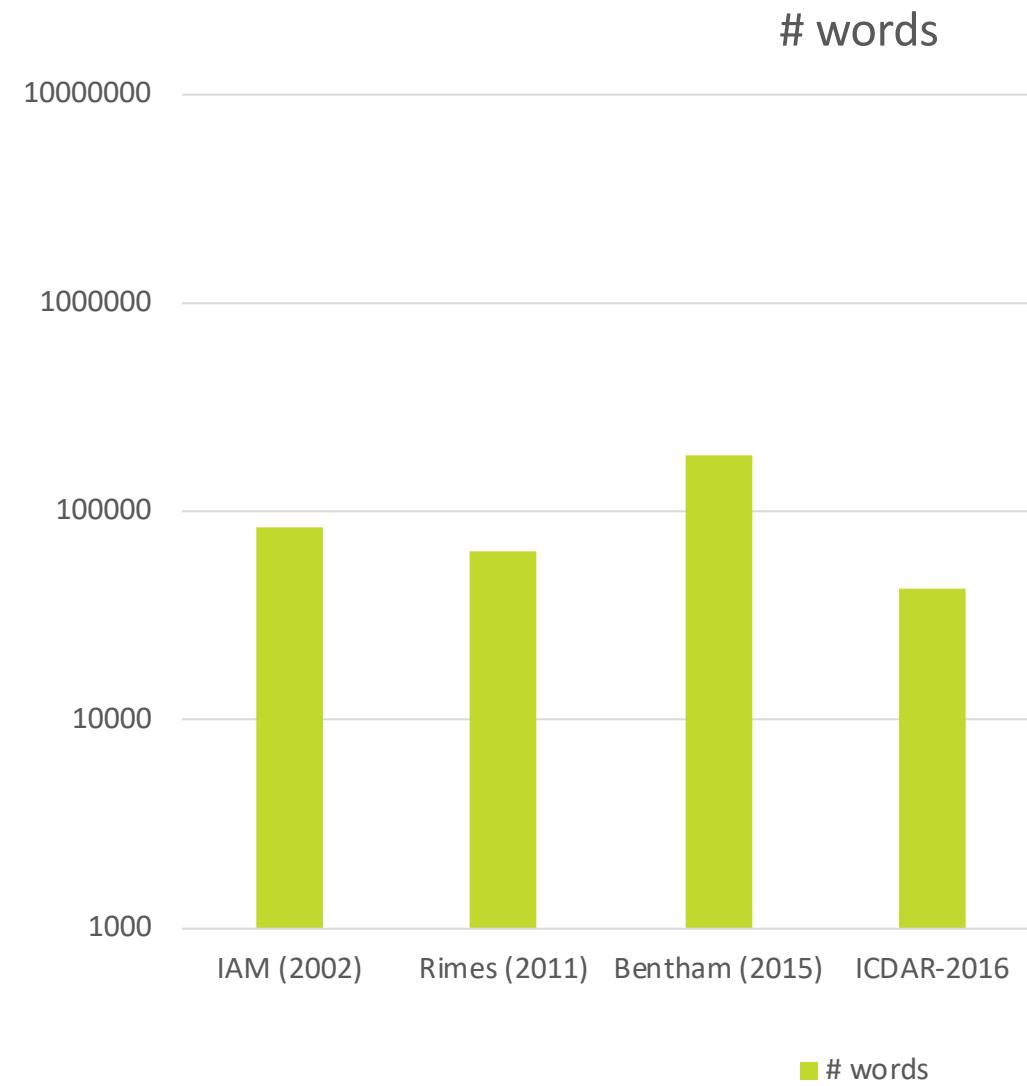
- Repeated Words Predicted Independently
- Model is general, not specific to this author's style.

Align Transcriptions to Images



In Congress, July 4, 1776. The unanimous Declaration of the thirteen united States of America, When in the Course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the Laws of Nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation. We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.--That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed, --That whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it ...

Exploit Available Data



Combined Transcribed
Data from Digital Archives



Adobe