Charles University in Prague
Institute of Formal and Applied Linguistics

Learning Hypotheses Decoding in an Image Text Recognition Pipeline

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Outline

Image Text Recognition

Learning the Decoding

Evaluation

Results

Future Work

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Image Text Recognition

→ FREEDOM

CMP: TextSpotter

- a tool developed at Centre for Machine Perception at the Czech Technical University
- input: an image, output: rectangles with words and their transcriptions
- scores well in the ICDAR competition
- only text localization and rectangle transcription in the competition

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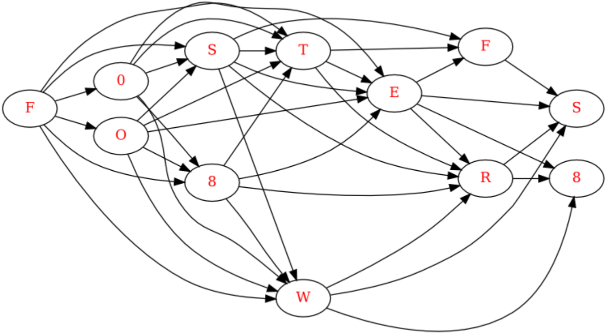

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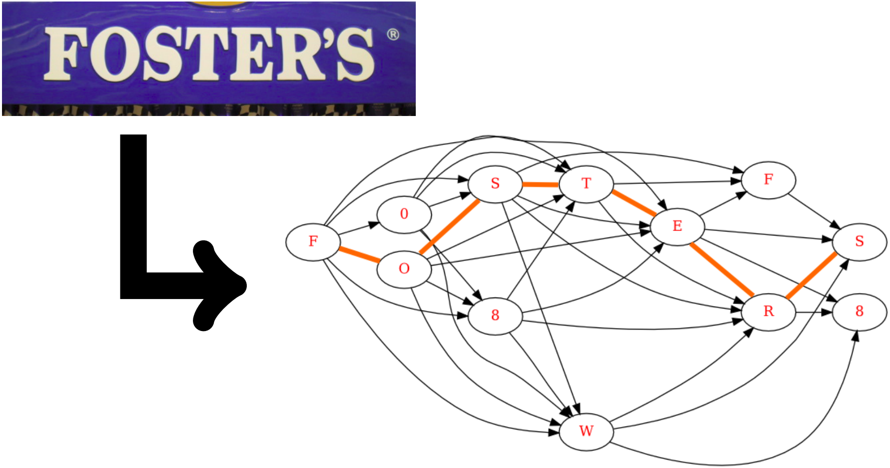

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Training Data Preparation

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- 568 used for training, 244 for intrinsic evaluation

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- originally 4 features: detected area similarity, OCR confidence, fitting the detected direction of text, simple language model

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- width, height, area ratio
- top line and bottom line deviations
- patterns: Xx, xx, XX, numbers
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in total 20 features

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in total 20 features

trigram features

- spaces ratio
- top line, bottom line, and cetral line angles
- character patterns
- trigram character language model

another 9 features

Independent learning

- all edges from all training graphs

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  - $\mathcal{Y}_{\mathbf{x}}$ ... all possible paths graph $\mathbf{x} \in \mathcal{X}$
  - $\Psi(\mathbf{x}, \mathbf{y})$ ... feature vector for path $\mathbf{y}$ in graph $\mathbf{x}$

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$$\Psi(\mathbf{x}, \mathbf{y}) = \sum_{e \in \mathbf{y}} \phi(e)$$ ← we want to guess this

  - $\mathbf{w}$ ... weight vector ← we want to learn this

Structured Predicition

- Structured Percetpron
  - simple moficiation of the standard Perceptron algorithm
- Structured SVM
  - wieghts optimized by quadratic programming
  - not constant margin, but a loss function
  - exponential number of path in a graph ⇒ exponentially many inequalities for quadratic programming
  - approximative algorithm

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  - full string accuracy

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- precision, recall, F1-measure
- for rectangles 90% area overlap required

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Intrinsic Measures

		avg. edit dist.	avg. rel. edit dist.	avg. length diff.	full string acc.
bigram edges	baseline	.6471	.1317	.0336	.6933
	indep. class.	.3320	.0682	.0615	.8074
	S. Perceptron	.4631	.0917	.1352	.7377
	S. SVM	.4385	.0817	-.0041	.7500
	S. SVM + indep. cl.	.3770	.0798	.0574	**.8156**
trigram edges	indep. classs.	.3975	.0749	.0451	.7787
	S. Perceptron	.4877	.1035	.0902	.7008
	S. SVM	.4016	.0768	.1148	.7746
	S. SVM + indep. cl.	.3975	.0765	.0779	.7787

Extrinsic Measures

???

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- employ structured prediction method with non-linear decision boundary
- automatically get more training data (in progress)
- publish the work

Thank you for your attention.