

Text Baseline Recognition Using a Recurrent Convolutional Neural Network

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Problem Setting



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- Extract text baselines as polygon
- Necessary step for Handwritten Text Recognition (HTR)

Our method



- Start point, angle and step size are given, how to extract baseline?
 - 1. Extract window patch
 - 2. Apply CNNs to predict angle of baseline segment
 - 3. Compute next start point
 - 4. Repeat
 - 5. If end is reached compute last baseline point



Our method



- The whole pipeline is differentiable
- Loss:
 - MSE compared with true baseline
 - Binary crossentropy for Line End Detector CNN
- Reset baseline coordinate every n^{th} position during training



Our method



- How to get start points, angles and step size?
- We use a U-Net inspired segmentation model with classes: start points, end points, baselines, text region
- Combine grayscale page image with segmentation for baseline and text region to improve baseline detection



Evaluation



- cBAD 2019: Competition on historical baseline detection
- 755 images for training, 755 images for validation, 1511 images for testing

Name	Precision Recall		F1 score
Ours ARU-NET [2] (Winner cBAD 2019)	0.872 0.937	0.890 0.926	0.881 0.931
Method A (With GT start points and angles and with segmentation)	0.953	0.974	0.963
Method B (With GT start points and angles and without segmentation)	0.882	0.972	0.924

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