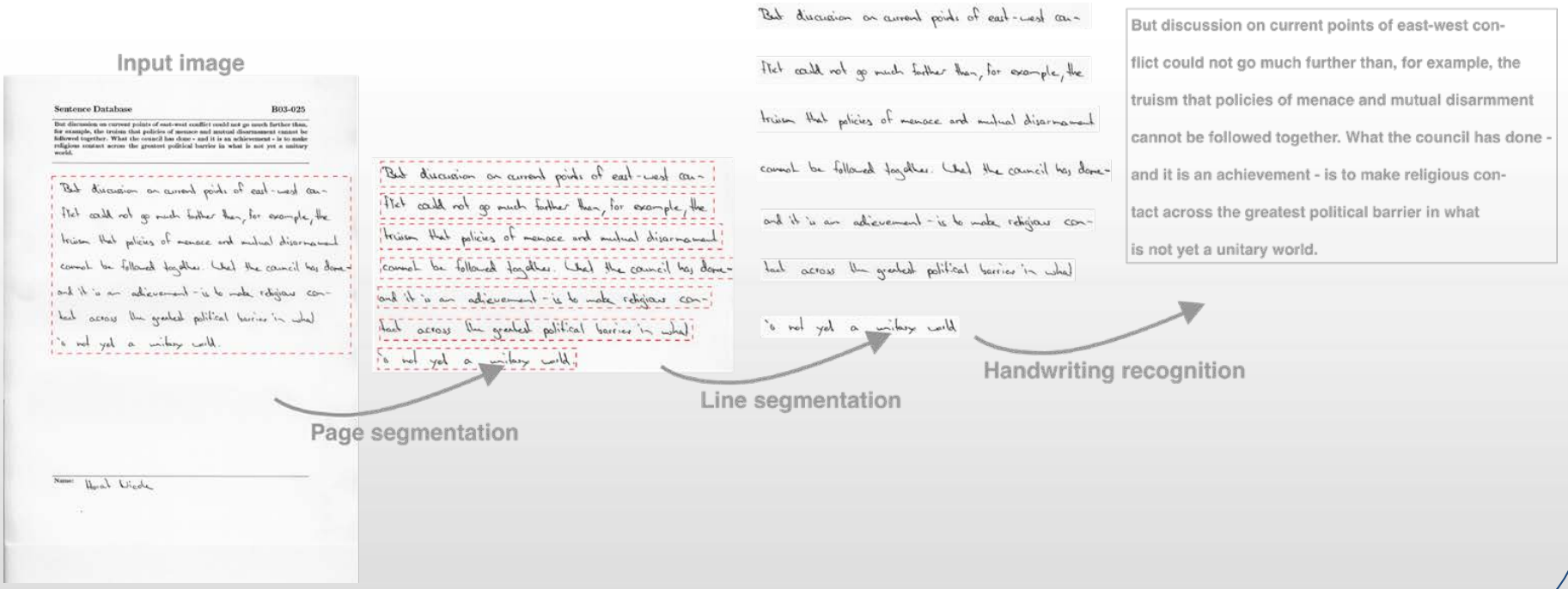
Handwriting Recognition

Problem Statement: Devising a deep learning approach detect handwritten text

Pipeline:



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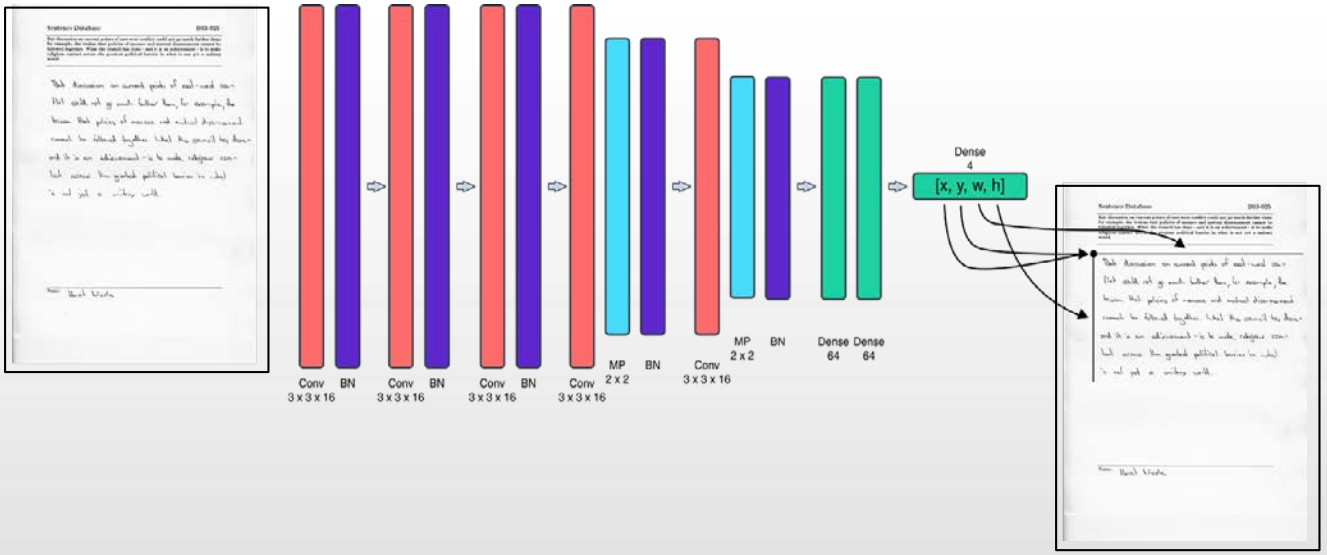
Network Architecture

Pipeline is composed of three steps:

1. Page Segmentation



The deep CNN using Apache MXNet takes the IAM document as an input and predicts the bounding box of the handwritten passage.

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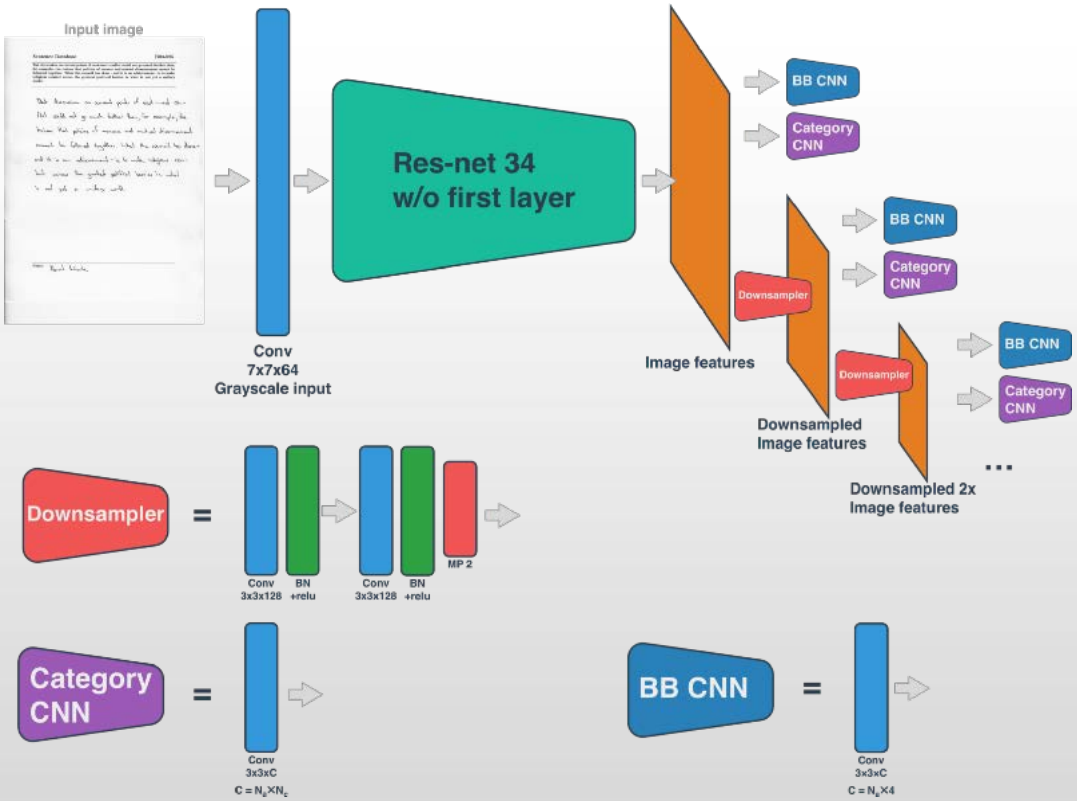
Network Architecture (contd)

2. Line segmentation: Handwritten text is segmented line by line so that each line can be used for handwriting recognition.

- Single Shot multibox Detector (SSD) architecture is used to detect the positions of each line of the passage.
- The SSD architecture takes image features and repeatedly downsamples the features.
- At each downsample step, the features are fed into two CNNs: one to estimate the locations of bounding boxes relative to anchor points (BB CNN), and one to estimate the probability of the bounding box encompassing an object (Category CNN).
- Data augmentation and Non maximum suppression methods are used to obtain meaningful results



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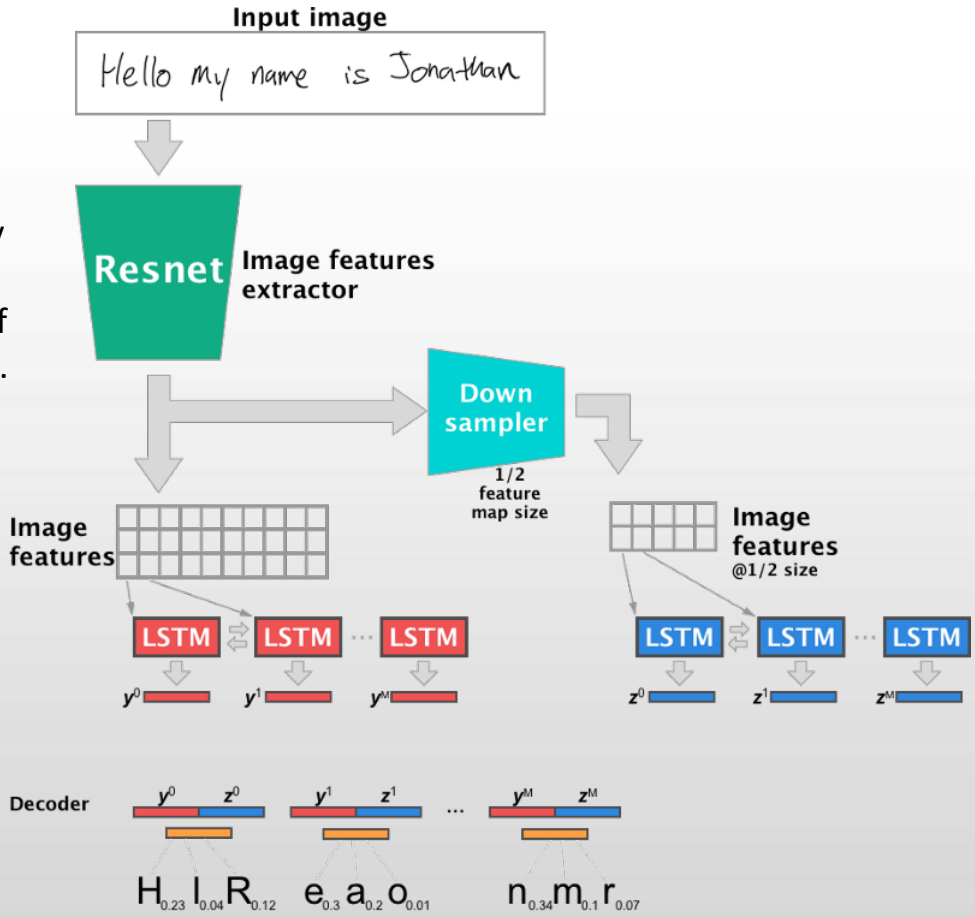
Network Architecture (contd)

3. Handwriting recognition and language modeling

- The CNN generates image features that are spatially aligned to the input image.
- Image features are then sliced along the direction of the text and sequentially fed into a biLSTM network.
- The output of the biLSTM network is fed into a decoder to predict probability distribution over the characters for each vertical slice of the image
- The network is trained to optimize Connectionist Temporal Classification (CTC) loss
- Beam search algorithm is used to extract the most probably sentence from the matrix



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