Modular Deep Encoders-Decoder

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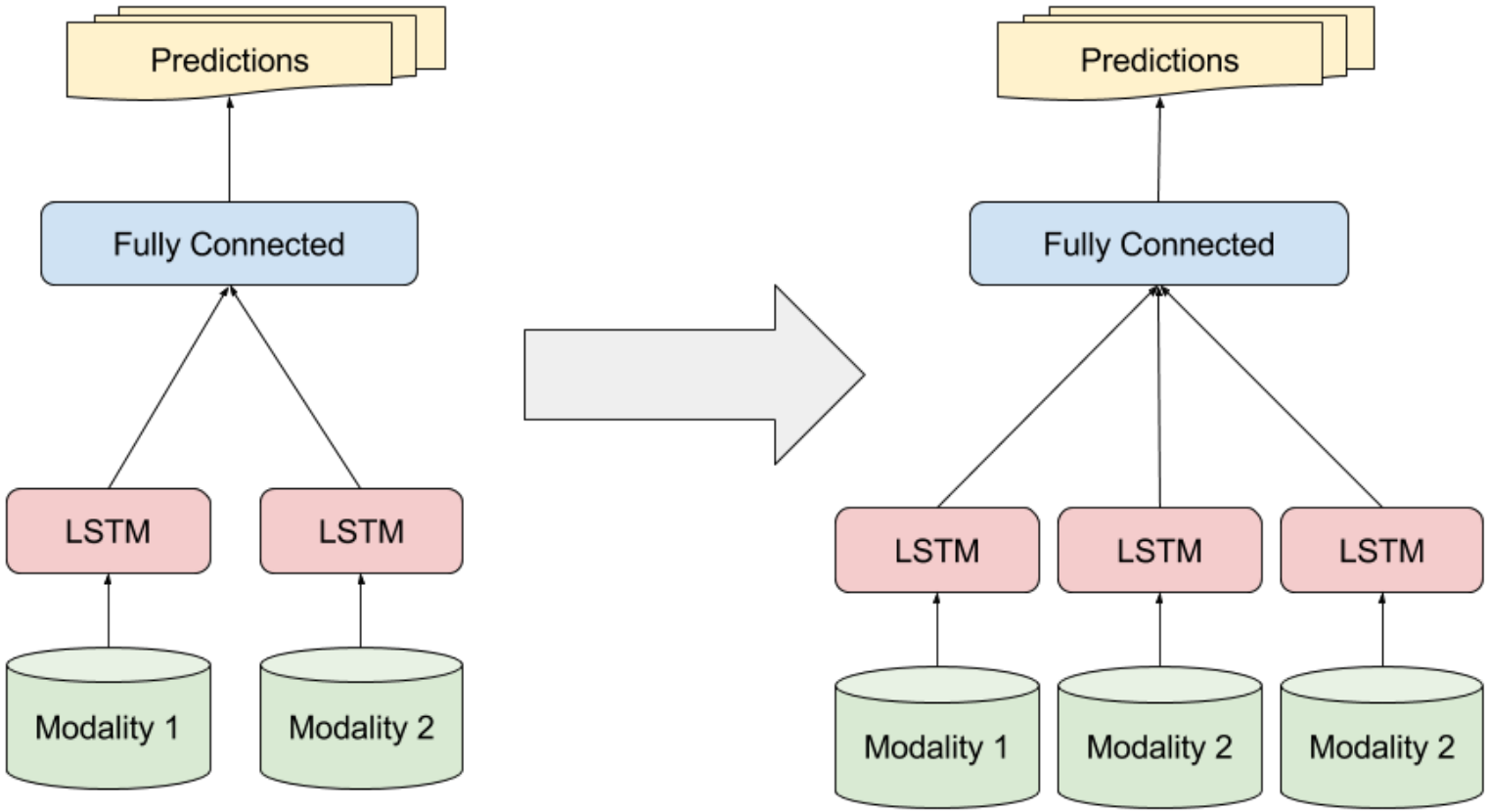
Task

How to incrementally train a multi-modal discriminative model when a new modality is included ?



Problem Definition

We want to jointly learn a set of *encoder* functions $\{E_i\}_0^N$ mapping samples $x \sim \chi_i$ from a set of data distributions $\{\chi_i\}_0^N$ to a fixed-sized vector embedding V.

$$\forall i \in [0;N] : E_i(x) : \chi_i \rightarrow V_i \in \Re^M$$

The embedding V is then fed into a decoder function D which learns a mapping to the label space L.

$$D(v) : \Re^M \rightarrow L \in \Re^D$$

To handle the new modality, we train a new encoder E_{N+1} which will modify V. We propose to use SGD solely on E_{N+1}, effectively transfering the parameters of previous models.

Experiment

Using the Arabic SaudiNews dataset, we built models to classify articles into journals.

SaudiNews Stats: 14 journals (ie, classes), 31’030 articles (about 50mb, 8.7M words), skewed prior distribution (52 vs 4.9k articles)

Modalities: Content, Title, Author (+ Date & URL)

For those experiments, we trained our custom models using the *neon* deep learning framework.

Preliminary Results

Same original model used for both representations.

Learnt Matrix Embedding (word-level)

Train Accuracy: 96.51%
Validation Accuracy: 50.5%

Word2vec Embedding (sentence-level)

Train Accuracy: 95.96%
Validation Accuracy: 46.42%

Future Work

Solve the overfitting problem. (hyper-params search ?)

Code the custom backpropagation path for the new encoder.

Train the augmented model.

Compare with Author modality, which should provide almost perfect accuracy.