An Approach for Weakly-Supervised Deep Information Retrieval
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Motivation
Relevance judgements are expensive to collect. We explore techniques to use alternative data sources for training data-hungry neural IR models. In this work, we evaluate our methods using the New York Times corpus.

Problems
Hard-Negative: Randomly chosen non-relevant documents are trivial to distinguish.
Mismatched-Interaction: Not all pseudo-relevant text pairs interact like relevant query-document pairs (e.g. poetic headlines.)

Ranking Filter
Rank pseudo-documents using an unsupervised ranker (e.g. BM25) and…
(1) Disregard pseudo-queries that do not retrieve their pseudo-relevant document in the top \(n_{rank}\).
(2) Select the top \(n_{neg}\) retrieved documents are negative training examples.

Interaction Filter
General Approach: Generate mock interaction embeddings and filter training examples down to those the most nearly match a set of template query-document pairs (given a distance function). Since interaction embeddings specific to what a model "sees," interaction filters are model-specific.

PACRR Interaction Filter: Interaction embedding calculated as maximum value for each query term in similarity matrix. Distance function is the aligned mean squared error—the MSE under the alignment that results in the minimum value.

Results
The technique improved results for models that encode ngram interactions (PACRR and MatchPyramid with 5×5 kernel).
Future work:
- Develop interaction filters for other models
- Alternative sources of template pairs for interaction filter

Figurative headline
WHEN BIRD FLIES IN
Larry Bird was in town the other day, and left, but chances are he'll be heard from again. He didn't arrive in disguise, and he didn't leave in disguise. Not quite. His game's the same - fill the hoop, fill the lane, fill the other team with vexation.


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