

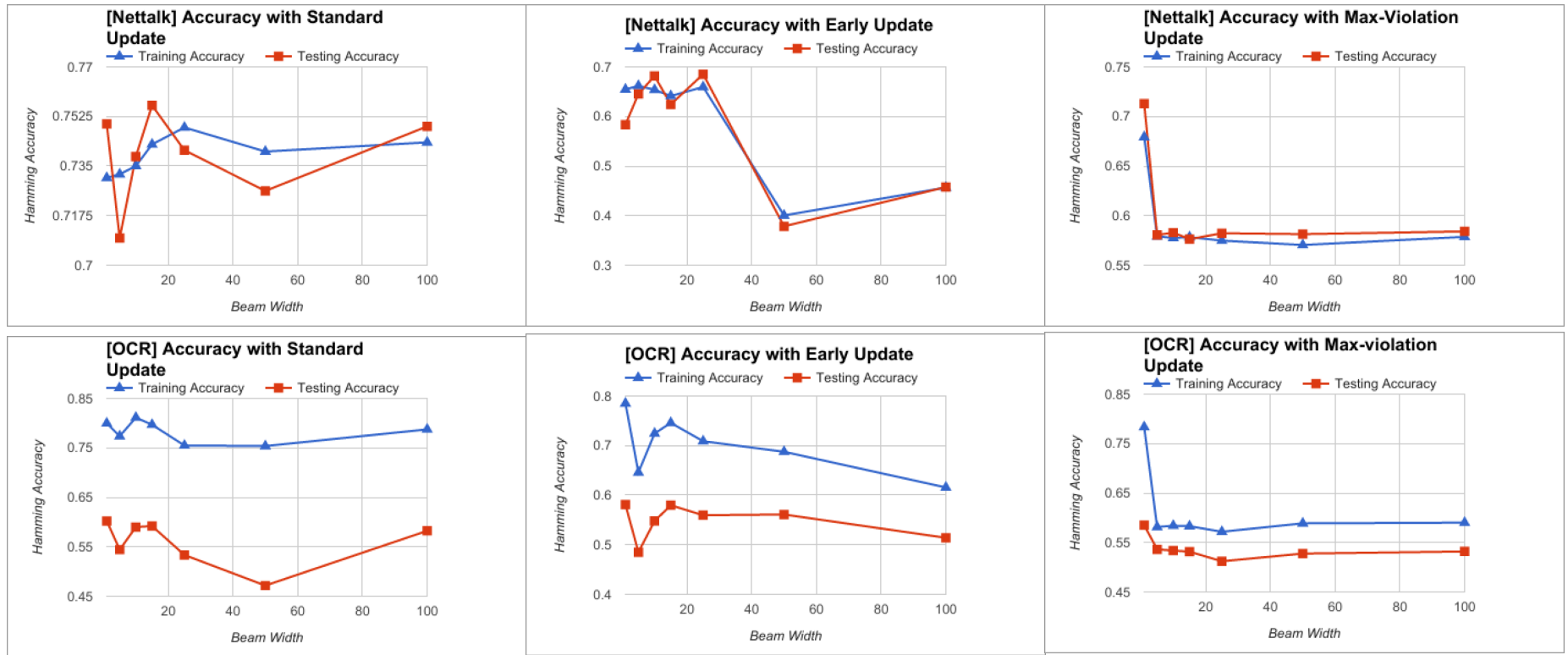
Homework 2

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CptS 580 — Structured Prediction
Prof. Jana Dopper, Ph.D.

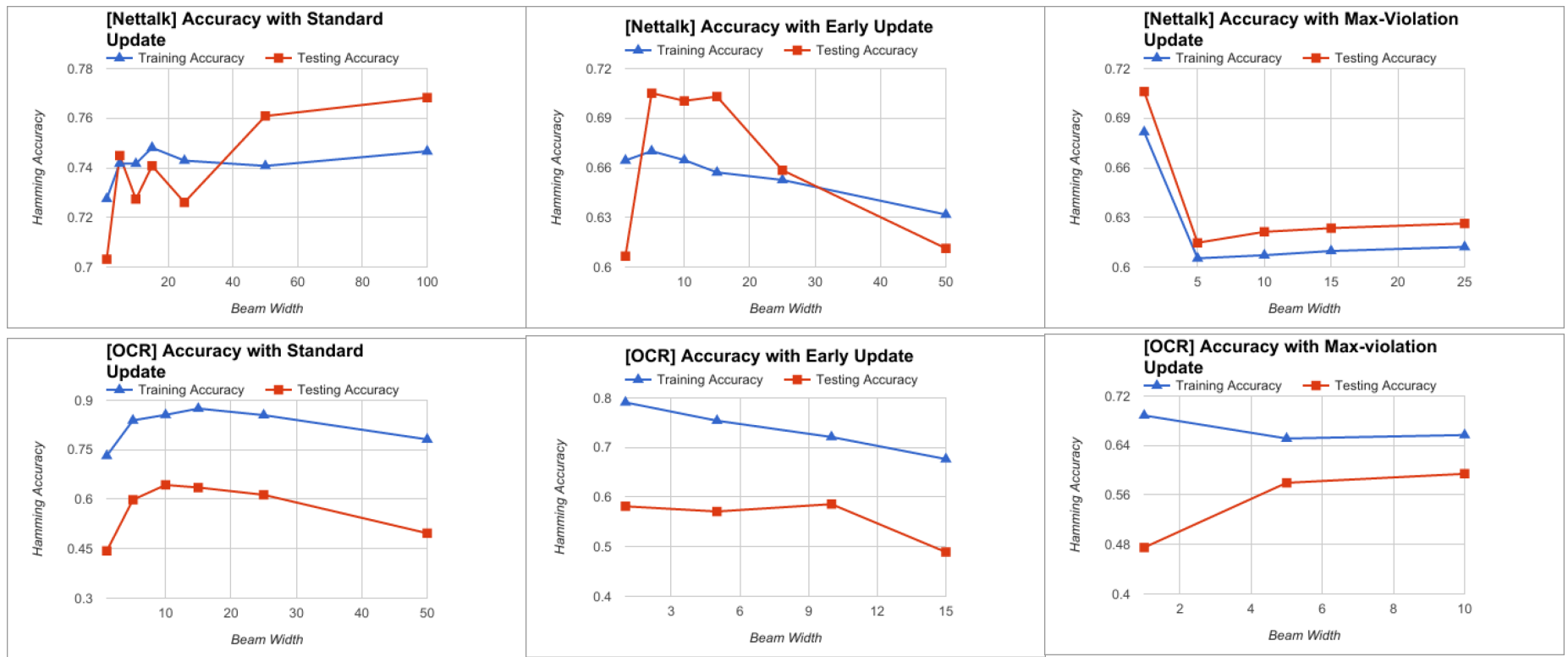
March 24, 2017

1 Structured Perceptron with Max-Violation and Early Update Policies

- (a) For the sake of keeping this submission simple, please view my GitHub repository <https://github.com/luke-dot-tec/StructuredPerceptron> for the complete Python code developed for this assignment. Attaching code seems too messy to insert and read.
- (b) See (a) above.
- (c) Again, see (a).
- (d) See **Attachment 1** for the graphs related to Best-first Beam Search under the standard, early, and max-violation update methods.
- (e) Check out **Attachment 2** for similar graphs, but related to Breadth-first Beam Search under the various update methods. Unfortunately, the beam sizes ran beyond the recommended range in some cases, and below that range in others.
- (f) This was a little interesting to me. We know from class that early update is much better than standard update, and max-violation is a little better than early update. However, this was not reflected in the data I collected. In fact, standard update — on average — seems to perform better than both early update and max-violation.
- (g) First off, Breadth-first Beam Search took the longest to complete. Each model (with specific hyperparameters) took 2+ ours each, as compared to about 15 minutes to an hour for Best-first Beam Search. With respect to accuracy, Breadth-First Beam Search seems to compete with Best-first Beam Search, and sometimes even beat Best-first. This is surprising, because we have learned that Best-first is generally the way to go.



Attachment 1. Best-first Beam Search plots of training and testing (Hamming) accuracy over beam width under various update methods.



Attachment 2. Breadth-first Beam Search plots of training and testing (Hamming) accuracy over beam width under various update methods.