**CPT\_S 580 HW2**

**Yang Zhang**

**11529139**

**(a) Implemented in Java**

**(b) Implemented in Java (will discontinue search when trigger the update condition in both early and**

**max-violation update modes)**

**(c) Implemented in Java**

**(d) Best-first Beam Search**

**(e) Breadth-first Beam Search**

**(e)** **List your observations about standard update vs. early update vs. max-violation update**

In both best-first and breadth-first beam search, the Hamming accuracy of standard update is usually higher than early update and max-violation update and it will be increased with wider beam width. The reason is that standard update will always update the weight regardless of if there is any target node in the beam, so that with wider beam the search algorithm could exam more candidates. Therefore, standard update learns more for each update.

For the early update and max violation update modes, the Hamming accuracy is lower than max violation update in best-first search but is higher than violation update in breadth first search. This is because that under best-first search, if early update could be triggered, the max violation update could be triggered as well. However, max violation update will update the weights later than early updates which means it will learn more than early update mode from each update.

**(f)** **List your observations about best-first beam search vs. breadth-first beam search based**

**training and inference.**

If the beam size is 1, both best-first beam search and breadth-first beam search behave the same way. Otherwise, the hamming accuracy of breadth-first beam search is generally higher than best-first beam search. The reason is that with the same beam size, breadth-first beam will generate much more candidates than best-first’s, which means breadth-first is more likely to have a correct candidate in its beam.