MT Homework 2

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1 Motivation and Model Description

We followed the align by agreement paper by Liang et al. (2006), which explained how to align by intersection. We also discussed in class about using a union model, so we attempted that as well.

Our model aligns by combining the information from aligning with an IBM model 1 in both directions. To train, we simply train an IBM model 1 from English to French and then from English to French. Using the English to French model, we can come up with the French word most likely to be aligned with our English word, called f. Similarly, we can come up with the English word that is most likely to be aligned with a French word from our French to English model, called e.

We then combine the results in two ways. First we can compute the intersection of these two models. When given the English $\bar{e}$ with the French word $\bar{f}$, we only align these two words only if $\bar{e} = e$ and $\bar{f} = f$. To compute the union model, we align the English $\bar{e}$ with the French word $\bar{f}$ if $\bar{e} = e$ or $\bar{f} = f$.

2 Results

You most likely experimented with various settings of any models you implemented. We want to know how you decided on the final model that you submitted for us to grade. What parameters did you try, and what were the results? If you evaluated any qualities of the results other than AER, even if you evaluated them qualitatively, how did you do it? Most importantly: what did you learn?

We tried aligning both via the intersection of the results of the IBM model 1 and via the union of these results. These models performed with varying degrees of success, as shown on the table on the next page. Intersection tended to perform with high precision, while the union model tended to have a better AER and a more well rounded performance. We suspect the union model performed better on this data because the union model allows for a "many to many" mapping, while the intersection model will only allow for one-to-one mapping. Since language alignment requires a many to many mapping, the union model performs better.

Model	Iterations	AER	Precision	Recall
Dice	-	0.680563	0.247944	0.653846
Model 1	10	0.654485	0.484848	0.236686
Model 1	20	0.641068	0.498084	0.251479
Model 1	50	0.634841	0.509653	0.509653
Model 1 two-way intersection	5	0.853846	0.596154	0.076923
Model 1 two-way union	5	0.650763	0..575269	0.224852
Model 1 two-way intersection	10	0.588727	0.751773	0.269231
Model 1 two-way union	10	0.439124	0.595420	0.520710
Model 1 two-way intersection	20	0.673160	0.677419	0.198225
Model 1 two-way union	20	0.468843	0.610119	0.452663

We had trouble training on the full data set because we ran out of memory. Our results are shown for 1000 sentences of training.