## Overview

We ran five experiments. See the appendix and the accompanying Jupyter notebook for reproducibility.

### 1. Develop using GPT3.5 zeroshot

We developed our first model using gpt3-5-zeroshot.jsonl, loading it with db-in and named it hmwk\_1\_zeroshot. We opted to use --training patience=800 to reduce the early stopping criteria to improve the time to train. For this initial model, we did not have a dedicated hold out dataset, and used Prodigy’s automatic partitioning of 20% the hmwk\_1\_zeroshot as the evaluation dataset. The model attained **32%** F1 score.

### 2. Create 200 unlabeled for evaluation dataset

For the 2nd experiment, we need dedicated hold-out evaluation dataset. We used a previously annotated .jsonl file and loaded it with db-in and naming it hmwk\_1\_eval. We then retrain on hmwk-1-zeroshot and eval on hmwk-1-eval. The model attained **36%** F1 score. We also ran a train-curve, which provided evidence that more annotated data would likely improve the model’s performance.

### 3. Train with Workshop Data with model in loop

For the next two experiments, we’ll explore: quantity vs. quality. In experiment 3, we’ll use all of the workshop data without correcting it (i.e., quantity). We loaded the data with db-in, named it hmwk-1-workshop, and merged it with the GPT3.5 Zero Shot as hmwk\_1\_train\_exp3. We kept hmwk\_1\_eval as the eval dataset. The model attained **52%** F1 score; therefore adding the workshop dataset adds **+16%** F1 score.

### 4. Run model-as-annotator on Workshop data to correct a sample

In experiment 4, we’ll focus on quality, correcting ~200 workshop annotations. We’ll use review so we can view both the model-predicted and workshop annotations. You could use ner.manual (original annotations) or ner.correct model predicted alternatively. Merging the corrected annotations with the GPT3.5 Zero Shot, yielded the hmwk\_1\_train\_exp4. We’ll keep using hmwk\_1\_eval as the evaluation dataset. The model attained **38%** F1 score. This indicates that while the full workshop dataset may have errors, it provides net gain in performance (quantity over quality).

### 5. Use word vectors (transfer learning) to improve model performance

For experiment 5, we’ll explore whether adding word embeddings improves model performance (see [Prodigy docs](https://prodi.gy/docs/named-entity-recognition#transfer-learning)). We used experiment 3 training dataset (best performance) and use hmwk\_1\_eval as the eval dataset. The model attained **59%** F1 score, which is the best performing model/experiment. However, this model is much larger (600MB vs 6MB); therefore, in prod, we may still want to go with model 3.

## Appendix

### Experiment Performances

| # | Training Dataset | Training (n) | Evaluation | Base Model | F1 | P | R | Size |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | GPT3.5 | 400 | 20% of training | None | 0.32 | 0.44 | 0.24 | 6 MB |
| 2 | GPT3.5 | 500 | Hold out eval | None | 0.36 | 0.41 | 0.31 | 6 MB |
| 3 | GPT3.5 + Workshop | 1577 | Hold out eval | None | 0.52 | 0.56 | 0.48 | 6 MB |
| 4 | GPT3.5 + Corrected | 699 | Hold out eval | None | 0.38 | 0.44 | 0.34 | 6 MB |
| 5 | GPT3.5 + Workshop | 1577 | Hold out eval | en\_core\_web\_lg | 0.59 | 0.58 | 0.59 | 600 MB |

### Saving Models (wheel)

To export each model, we used spacy package, saving it as a Python package to a models folder. This saves the model as wheel which compressed the model.

To install any of the models, you can the use pip install like

$ python -m pip install models/en\_ner\_reddit\_cooking-5.0.0.tar.gz  
Processing ./models/en\_ner\_reddit\_cooking-5.0.0.tar.gz  
 Preparing metadata (setup.py) ... done  
...  
Successfully built en\_ner\_reddit\_cooking  
Installing collected packages: en-ner-reddit-cooking  
Successfully installed en-ner-reddit-cooking-5.0.0

You can then run the model like:

import spacy  
nlp = spacy.load("en\_ner\_reddit\_cooking")  
doc = nlp("Make a dressing with mayo, plain yogurt, curry powder, mustard powder, mustard, ground coriander.")  
doc.ents  
# (mayo, plain yogurt, curry powder, mustard powder, mustard, ground coriander)