Active Learning with ALEX

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Active Learning (AL) with bootstrapping

- Goal: to select the best examples from an unlabelled pool of data to annotate/label to improve a model trained with the addition of these labeled examples
- During each step of AL bootstrapping we aim to select the next batch of instances for annotation
- We start with a model trained on a small set of labelled data, then employ a selector function to decide if an unlabelled instance is to be annotated
- Re-train model on larger set of annotated data

AL heuristics - selector function

- Random sampling: select instances from the unlabelled pool at random to annotate
- Uncertainty sampling: select instances with the least confident predictions to annotate
- ALEX: use KL-divergence between an unlabelled instance and each labelled instance

ALEX algorithm

```
2
3   for each unlabelled instance x:
4       pass x through model to compute most likely posterior class
5
6   let C = the k instances with the lowest model predictions
7
8   for each x in C:
9       compute mean KLD between the explanation vector of x and the labelled instances
10      let D = the b instances from C with the highest KLD
11
12  add these to S to be annotated before next bootstrapping step
13  remove these from U
14
15
16
```