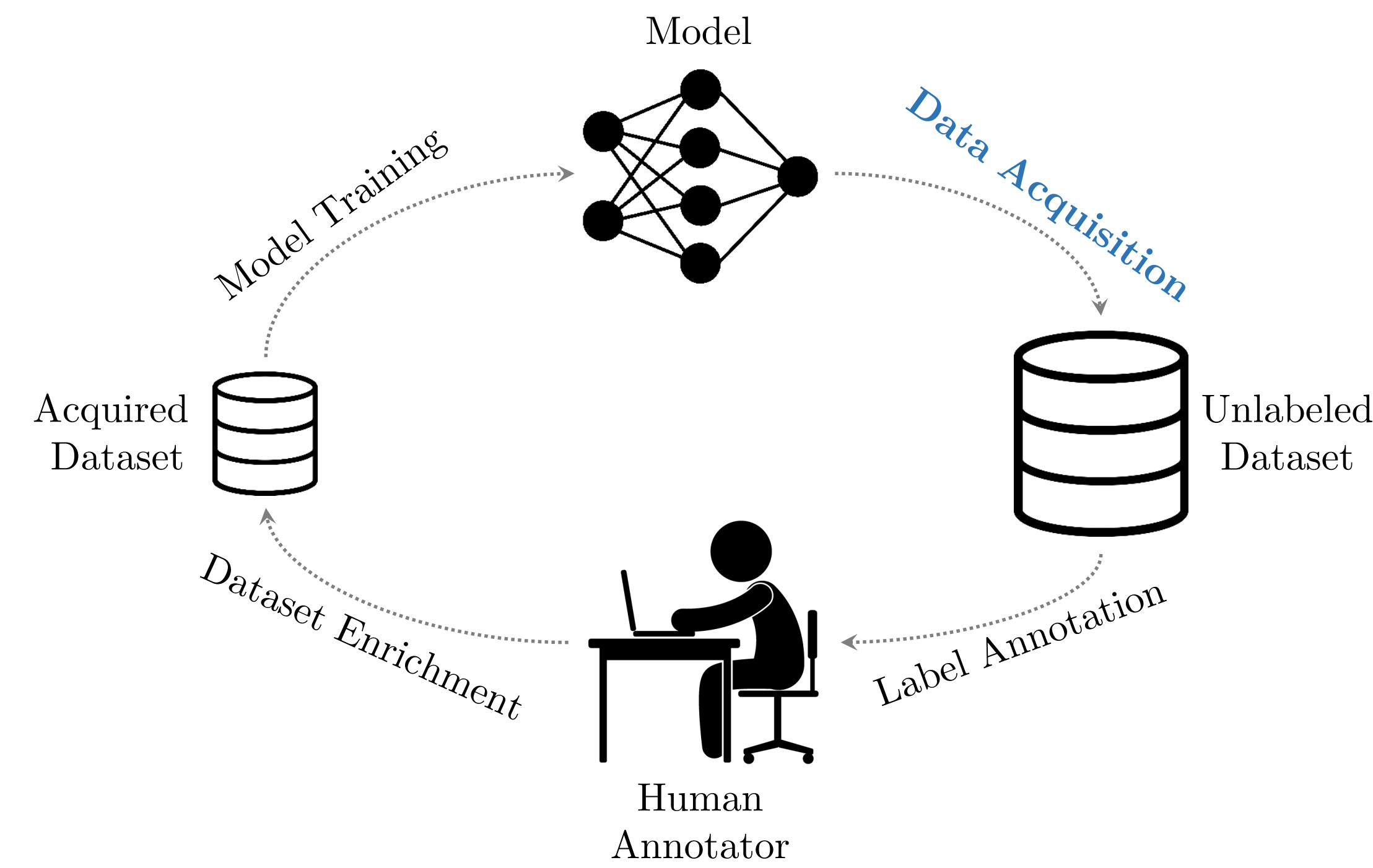


Active Learning

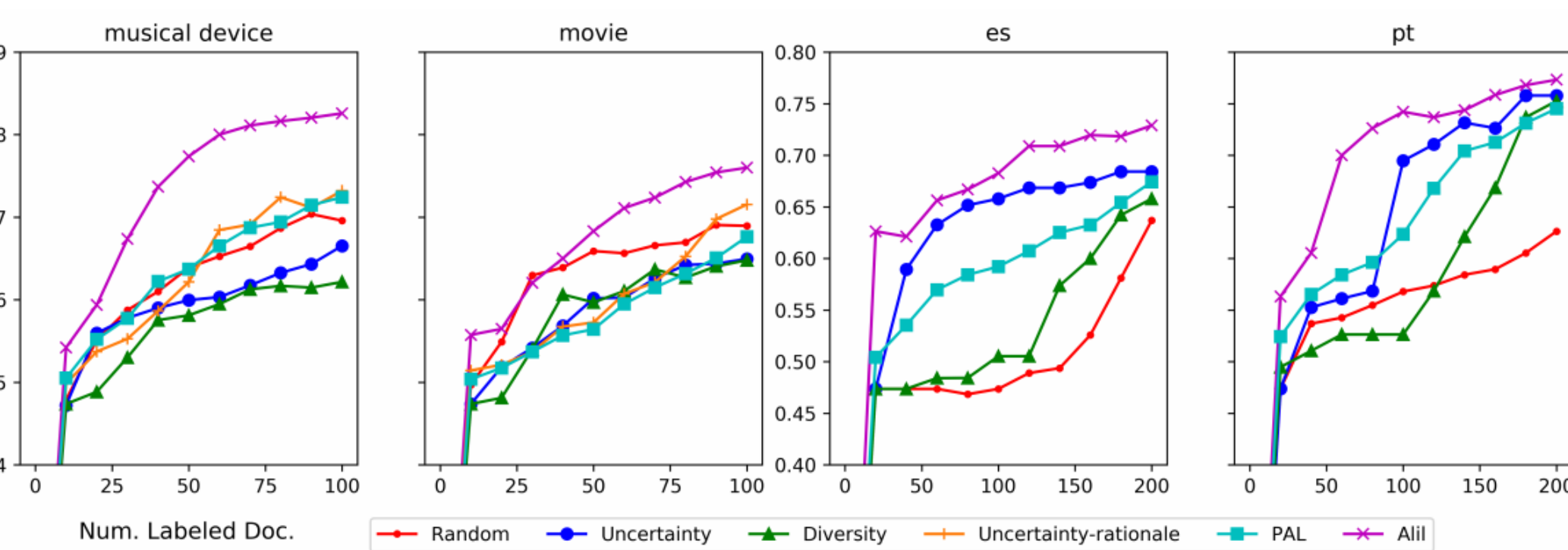
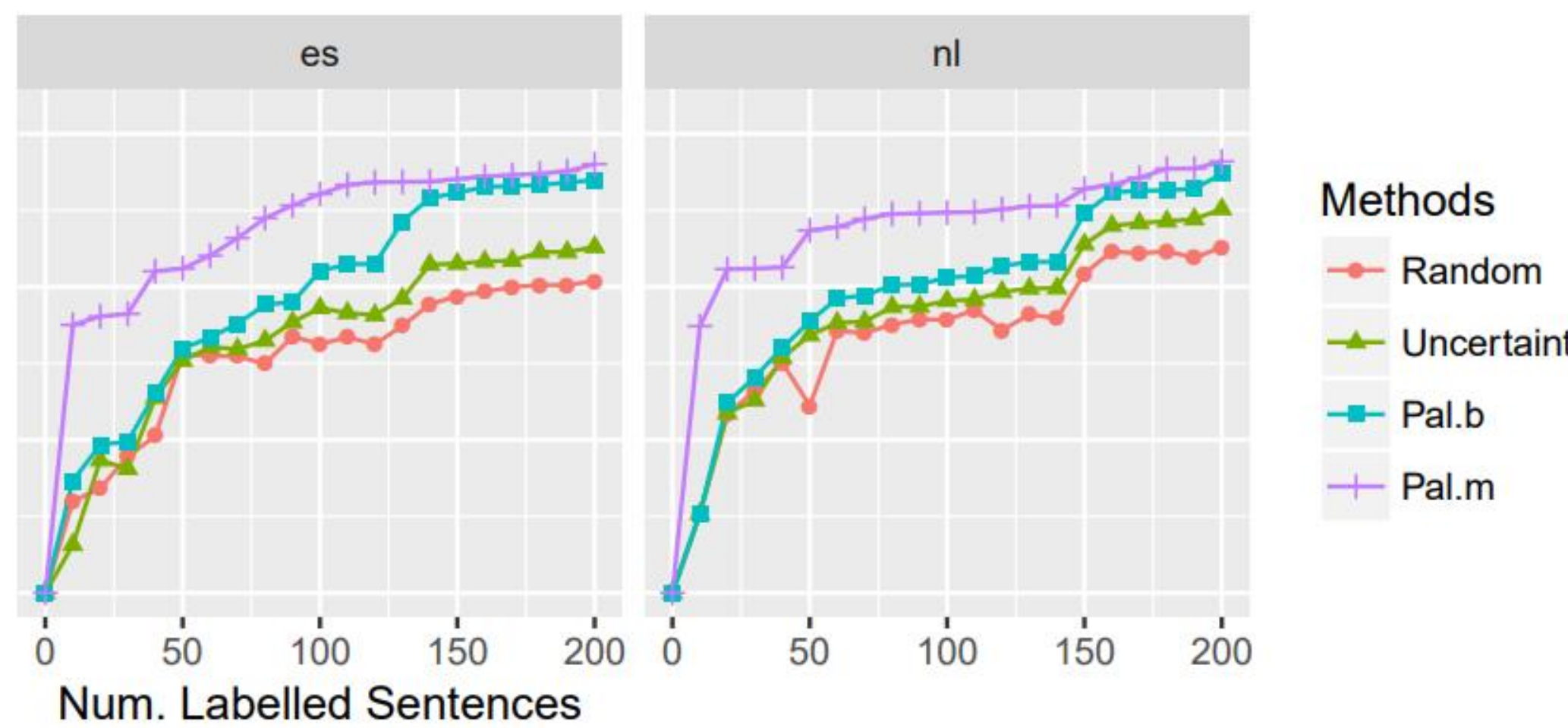


Heuristics:

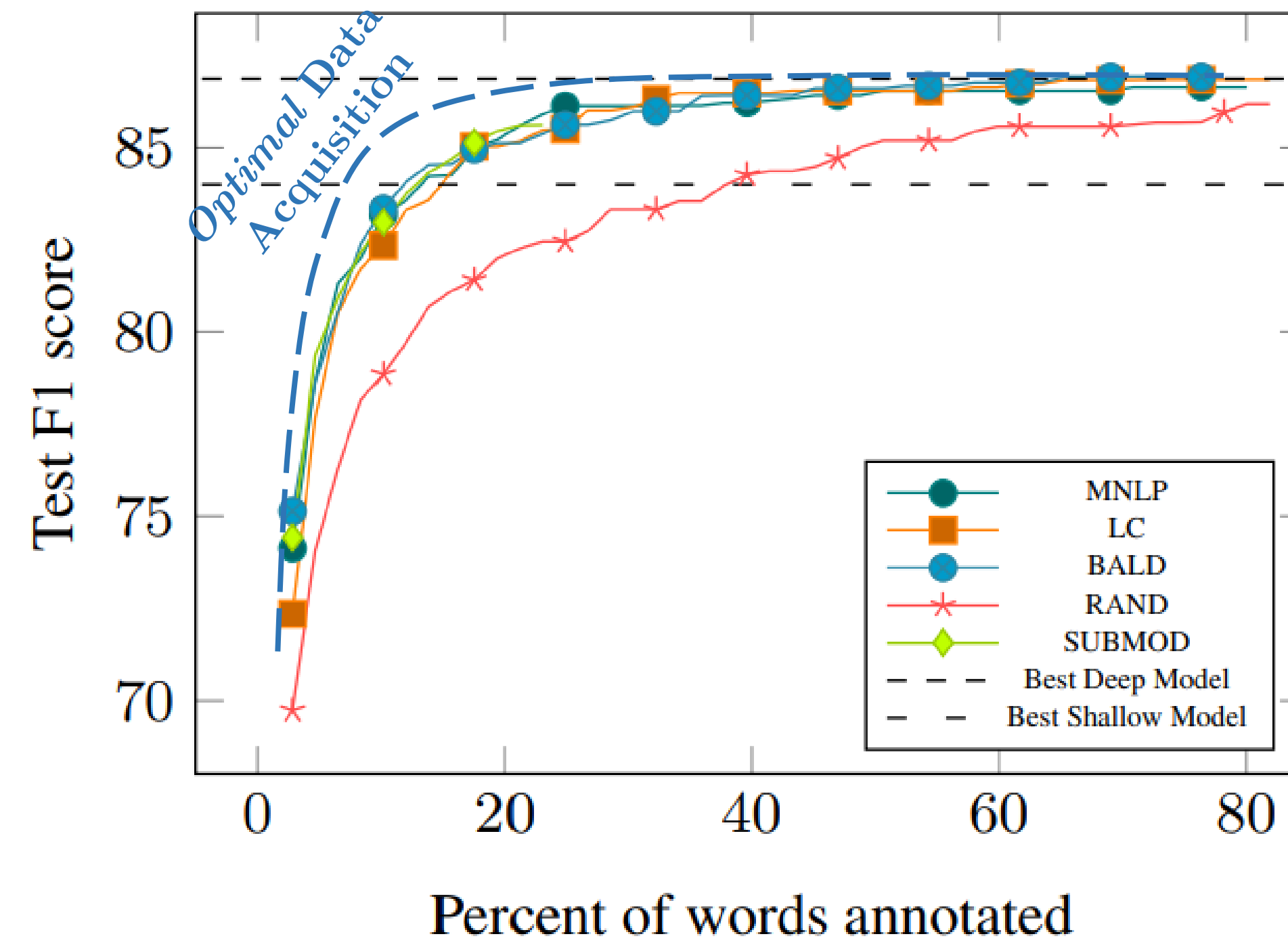
- Uncertainty
- Diversity
- Disagreement

Learning-to-actively-learn:

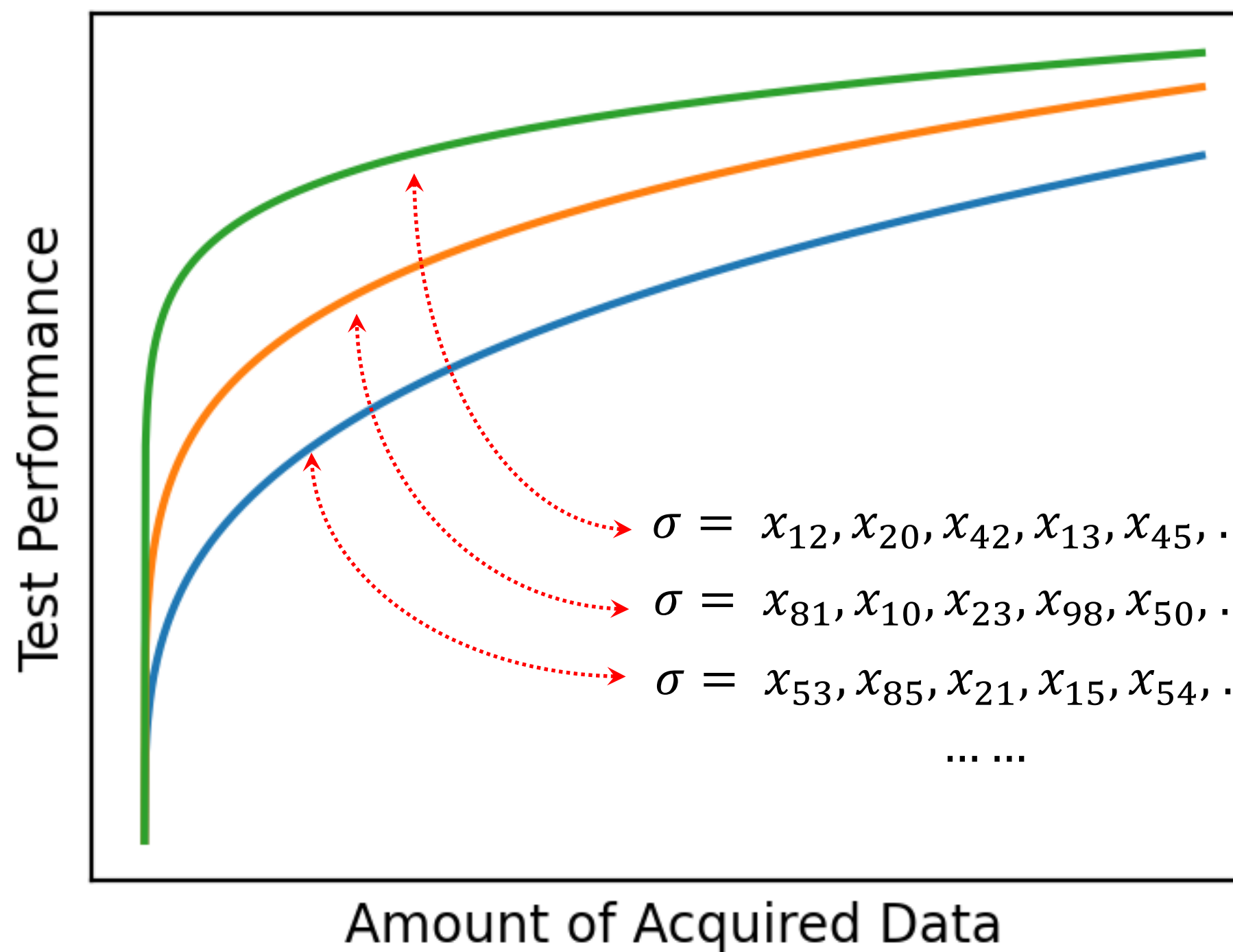
- Reinforcement learning
- Imitation learning



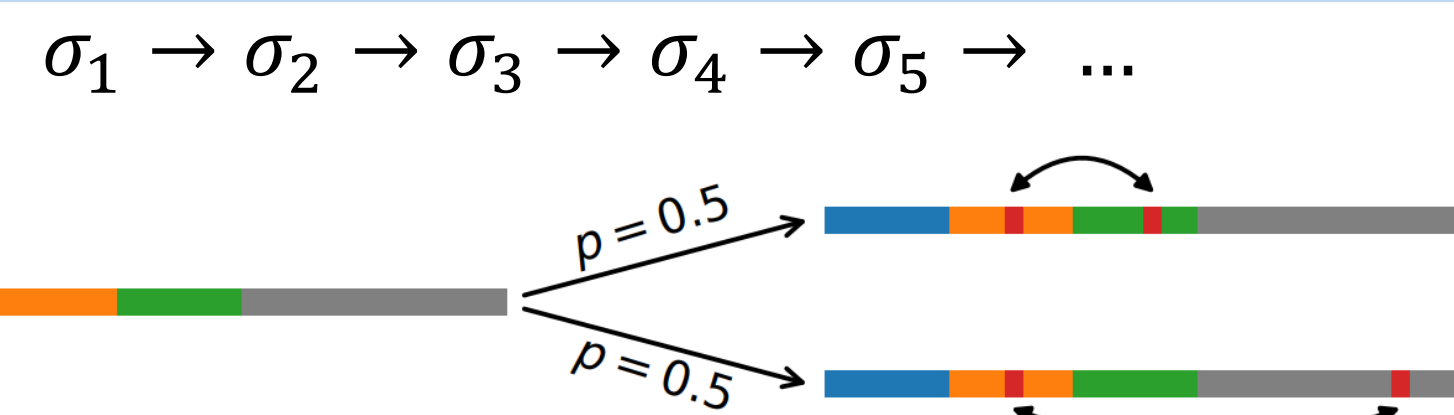
Optimal Active Learning



Acquisition Strategy \Leftrightarrow Labeling Order



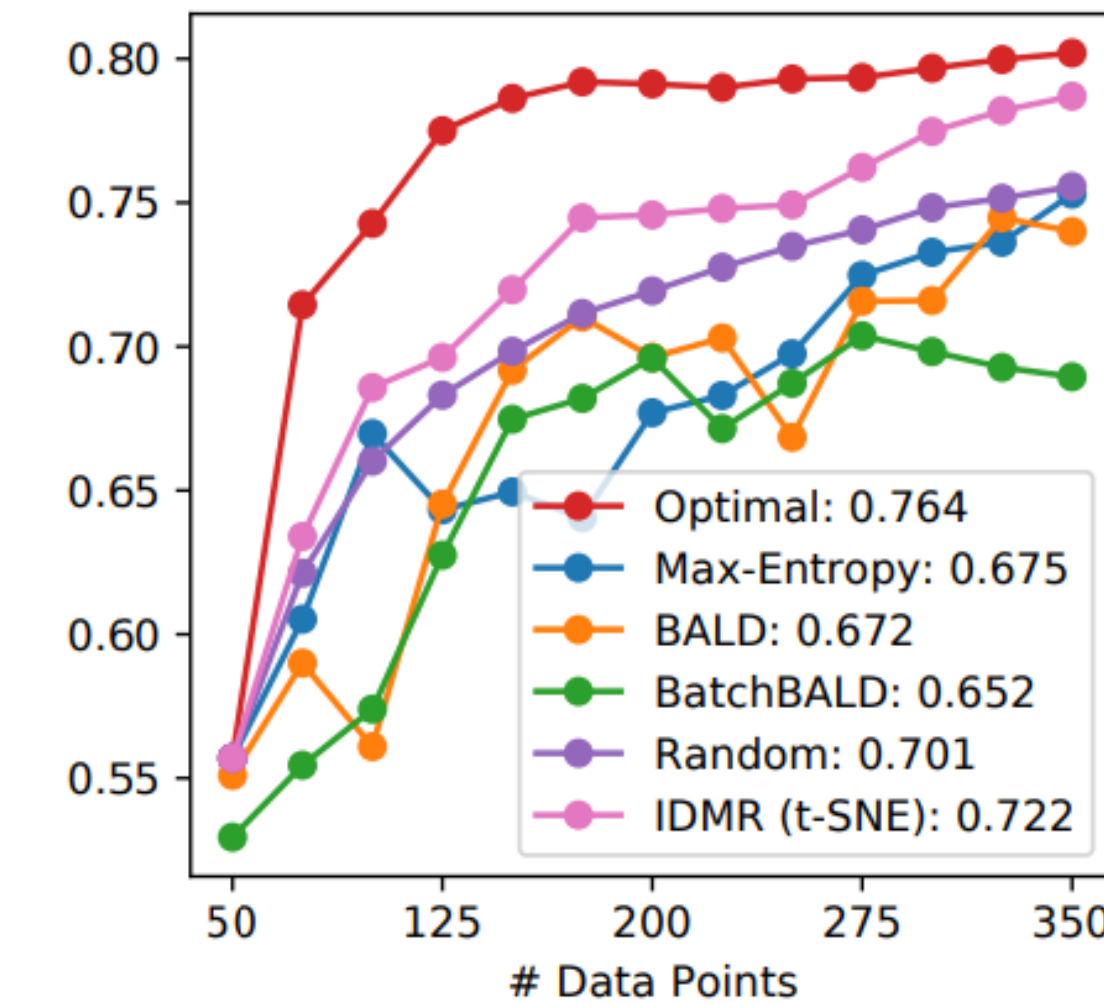
Simulated Annealing Search



Experiments

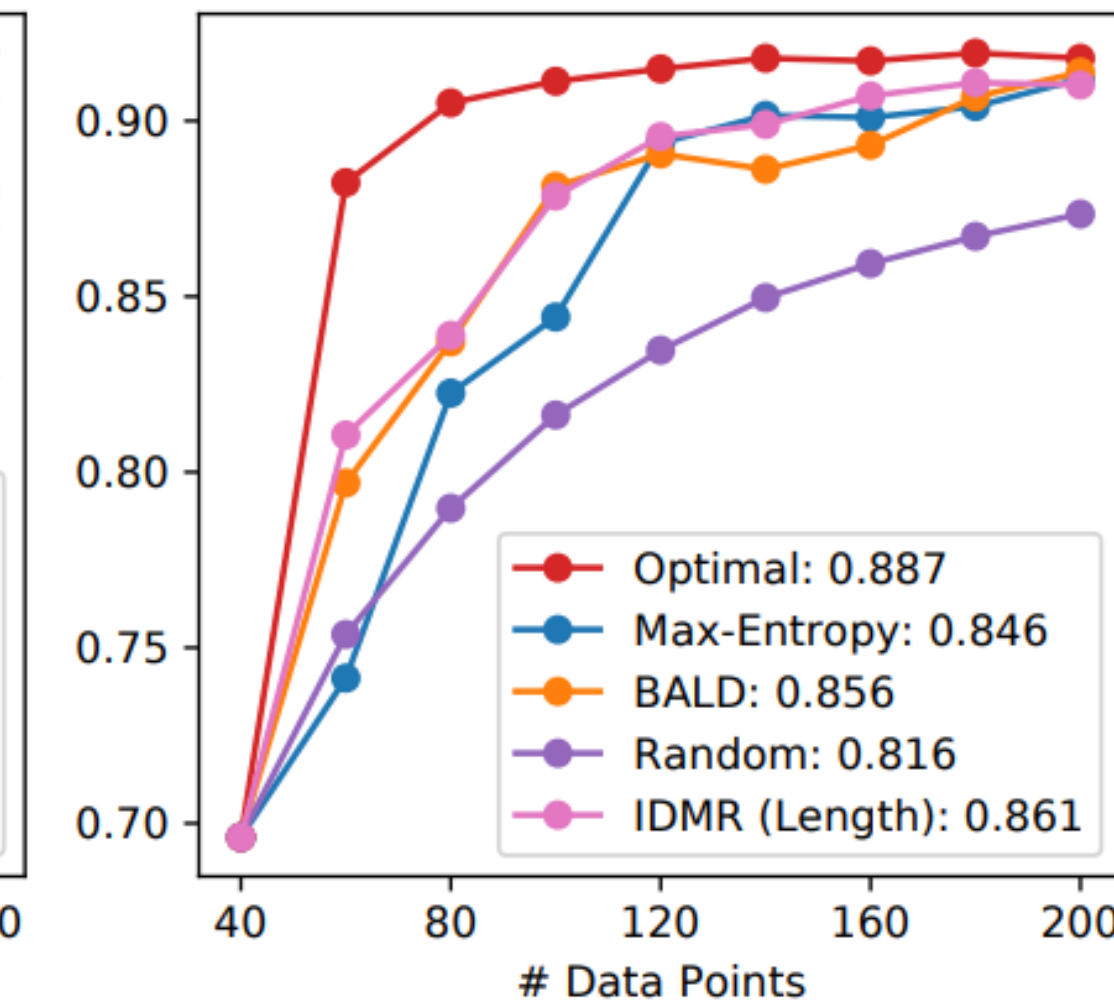
Object classification (CV)

- Fashion-MNIST
- Varying difficulty among classes



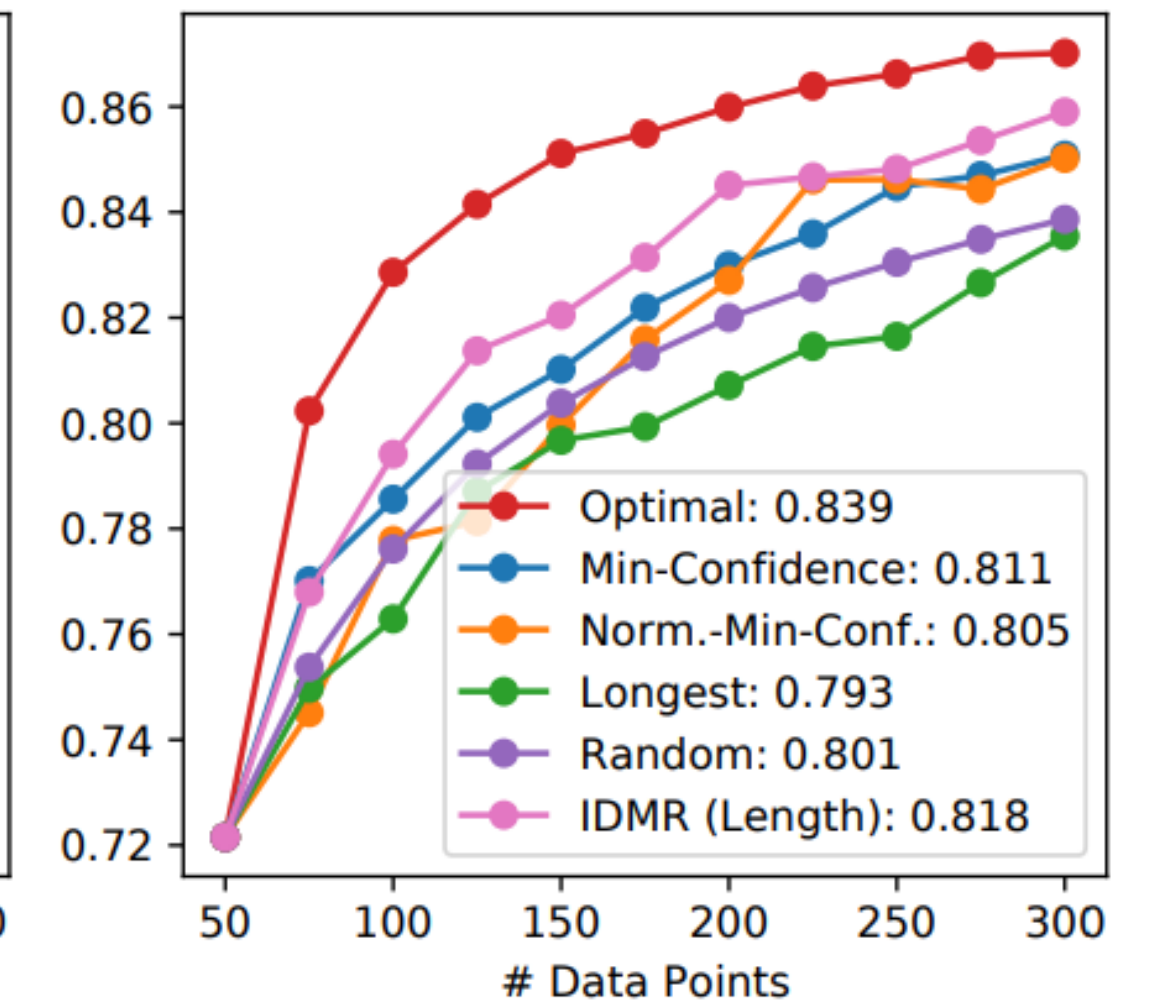
Intent Classification (NLP)

- TOPv2 (Task-Oriented Parsing)
- Extreme class imbalance



Named Entity Recognition (NLP)

- MIT Restaurant
- Structured prediction



	OC	IC	NER
Optimal	0.761	0.887	0.839
Best Heuristic	0.682*	0.858	0.811
Random	0.698*	0.816	0.800

	Object Classification					Intent Classification				
0	0.764	0.748	0.753	0.754	0.748	0.887	0.880	0.884	0.883	0.884
1	0.755	0.760	0.752	0.753	0.751	0.872	0.882	0.880	0.879	0.879
2	0.757	0.746	0.764	0.760	0.750	0.883	0.880	0.891	0.882	0.889
3	0.749	0.746	0.750	0.762	0.749	0.883	0.881	0.883	0.884	0.882
4	0.742	0.729	0.743	0.742	0.756	0.876	0.879	0.882	0.883	0.890

	Optimal				Random	Heuristic			
LSTM	0.887	0.869	0.877	0.845	0.817	0.860	0.850	0.852	0.838
AOE	0.781	0.853	0.811	0.764	0.754	0.781	0.799	0.794	0.756
CNN	0.847	0.855	0.879	0.814	0.798	0.845	0.848	0.848	0.818
RoBERTa	0.896	0.897	0.905	0.914	0.874	0.890	0.827	0.890	0.891

