Towards Understanding the Behaviors of Optimal Deep Active Learning Algorithms

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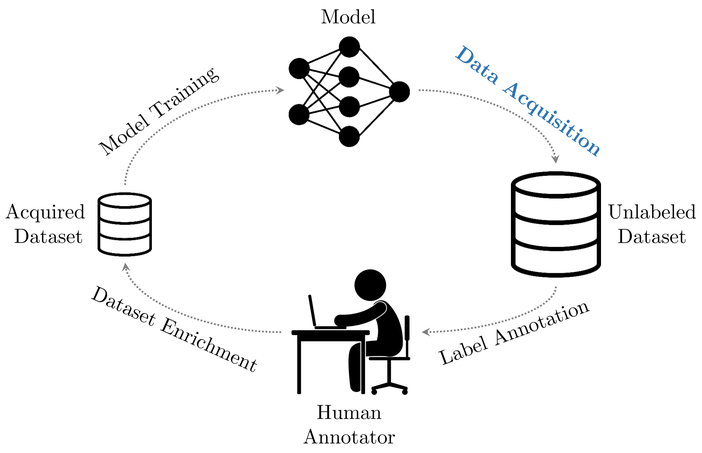
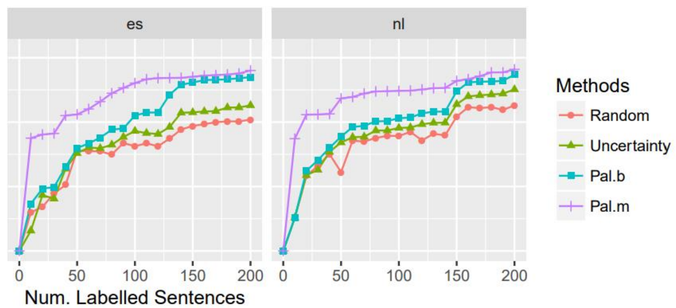
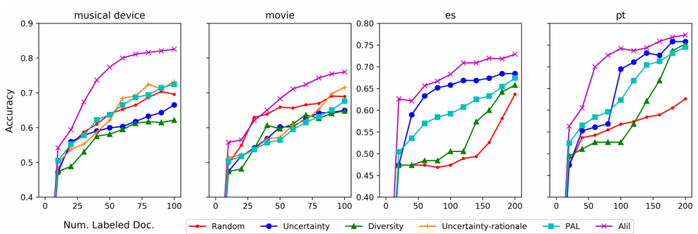
Active Learning



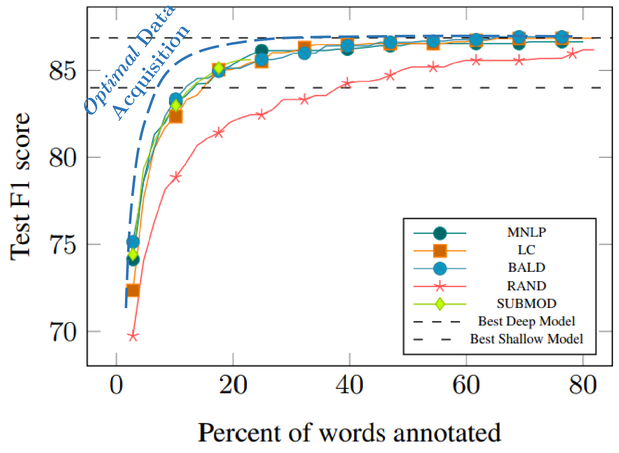
Heuristics:
- Uncertainty
- Diversity
- Disagreement

Learning-to-actively-learn:
- Reinforcement learning
- Imitation learning

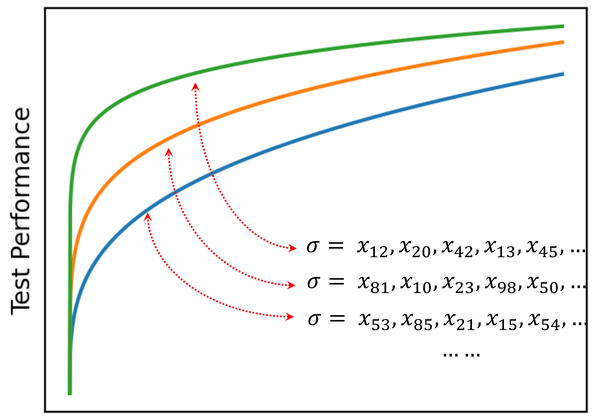




Optimal Active Learning

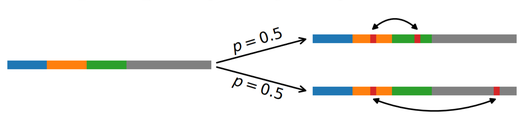


Acquisition Strategy ⇔ Labeling Order



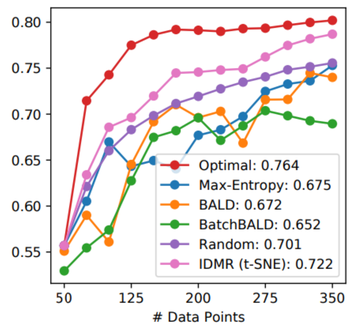
Simulated Annealing Search

$\sigma_1 \rightarrow \sigma_2 \rightarrow \sigma_3 \rightarrow \sigma_4 \rightarrow \sigma_5 \rightarrow \ \ldots$

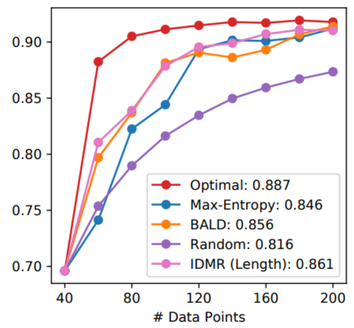


Experiments

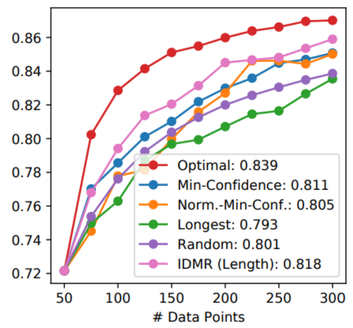
Object classification (CV)
- Fashion-MNIST
- Varying difficulty among classes



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