



Budget-Limited Adaptive Crowdsourcing

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1. Adaptive Crowdsourcing

Crowdsourcing systems:

Use mass of human intelligence to solve hard AI problems







4. Software Framework

Supports many stateof-the-art crowdsourcing models:

Majority voting

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Running: 53/1420										
Curr	ent task selection	CBCC:Entrop	yTask1		•					
Schedule 4. Workers 📰 Values 💽 Communities										
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2	1901	80057477	1.54861442680	0	0					
3	1570	81171616	1.52293199029	0	0					
4	249	81990794	1.53220782761	0	0	H				
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Single response is *unreliable* redundant task allocation

How many responses/task are *sufficient* when budget is limited?

Adaptive manner: *online* task allocation

cost savings

2. Real World Applications

Tweet Sentiment Analysis





CrowdFlower dataset:

- 98,935 Tweets
- 569,7860 Judgments
- 1,960 Workers

- Dawid & Skene
- BCC
- CBCC

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	6	1017	79194550	1.54768492054	0	0
	7	1595	79194933	1.55355340156	0	0
	8	786	80050064	1.55977483462	0	0
	9	911	80050108	1.56361191936	0	0
	10	1194	81174487	1.56624943988	0	0
	11	884	81991168	1.56771527970	0	0
	12	420	81992487	1.57061201978	0	0
	13	1571	81992349	1.56303106958	0	0
	14	1886	81176506	1.56587949289	0	0
	15	1194	81178007	1.56938143962	0	0
0.74	16	1886	81178016	1.56696372048	0	0
	17	740	81176506	1.09301555727	0	0
0.73 + + + + + + + + + + + + + + + + + + +	18	1846	81178016	1.13585988784	0	0
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Crowdsourcing Project Number of Labels	20	251	7010/022	1 06745648074	n	0
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Active Learning Experiment Interface



Updated inference results

- Confusion matrices
- Communities
- Task's label predictions

🥾 Crowdsourcing Project		×
FILE HELP		
🝊 Home 🖪 Run Batch Running 🗖 Run Ac	tive Learning 📑 View Dataset	T

Text Sentiment Analysis

Dataset:

- 5000 Text snippets
- 27.746 Judgments
- 204 Workers

Music Genre Classification

Dataset:

- 10 Music files
- 2.945 Judgments
- 44 Workers

3. Intelligent Task-Worker Selection

Probabilistic model of worker's reliabilities and aggregated labels:

Bayesian Classifier Combination (BCC) [Simpsons et al., 2013]







Evaluate different

active learning methods:

- Random sampling
- Entropy
- Expected gain



Label Posterior Probabilities of Each Task

Run Active Learning Experiment with Various Models:

- Adapt Models with Different Task Selection Strategies \bullet
- Dynamic accuracy and utility graphs \bullet
- Real-time data of schedules. tasks, workers and communities \bullet

5. Future Work



Scalable inference using Infer.NET

Worker

Model-Based Active Learning for Label Selection:

•Entropy-based utility to select tasks •Forward planning frameworks (MDP, Expected information gain) to select workers and tasks



Task-worker selection with large uncertainty

- Utility estimation is noisy
- Current frameworks follow greedy approach
- Additional learning layer to be added
- Idea: multi-armed bandit + BCC









Crisis and Disaster Respons

