

Active Neural Networks to Detect Medication Change in Social Media

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MOTIVATIONS

- ❑ 50% of patients do not adhere to their treatments, despite serious consequences: worsening health conditions or death
- ❑ **Understanding reasons for nonadherence** is a condition for successful interventions
- ❑ Traditional sources to understand nonadherence are limited, complementary sources such as **Social Media** data can be useful

METHODS

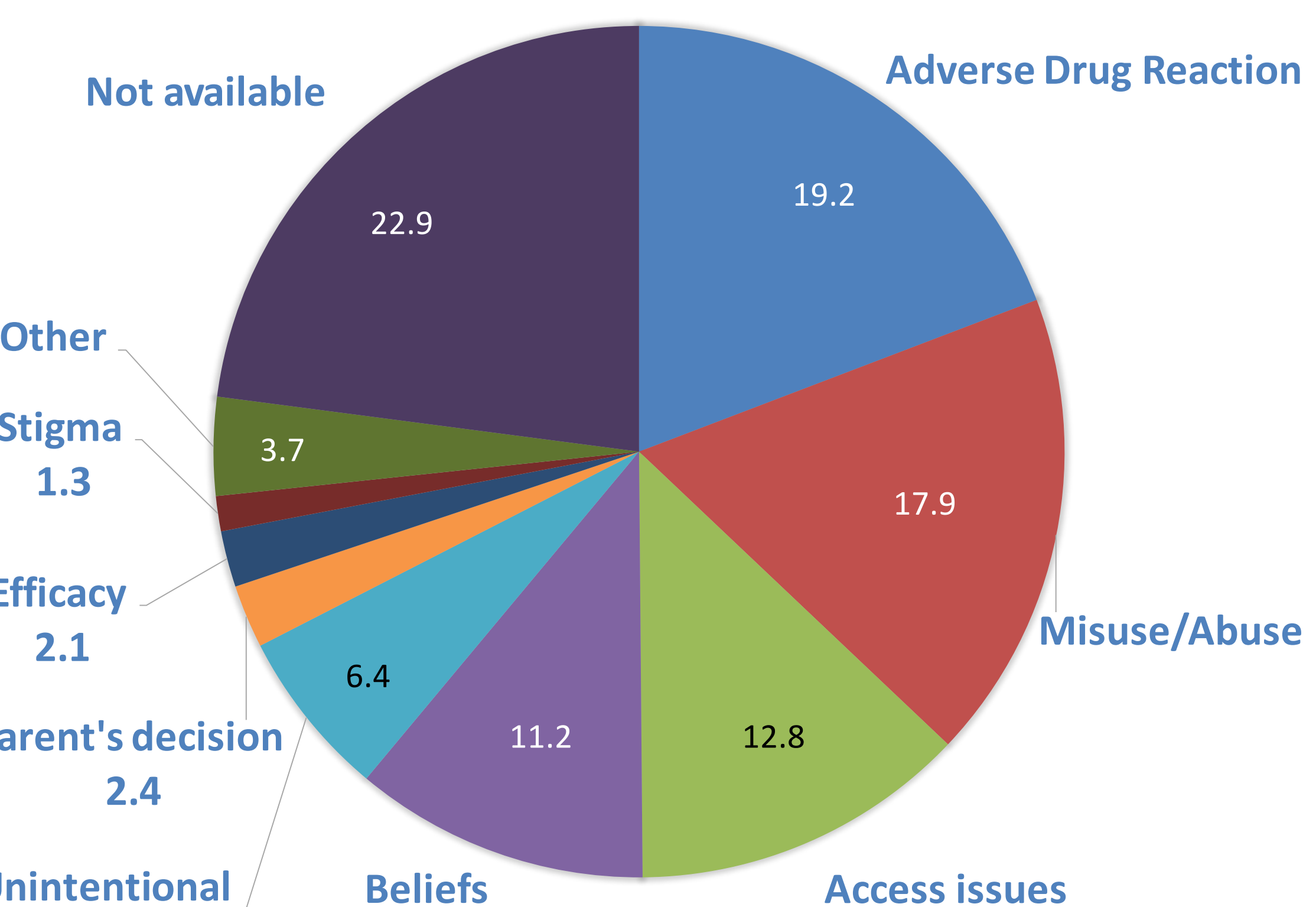
1. Two corpora created:

- WebMD reviews: 12,000 reviews, ~50% mention a change in medication regimen
- Twitter corpus: 9,000 tweets, ~8.7% mention a change in medication regimen

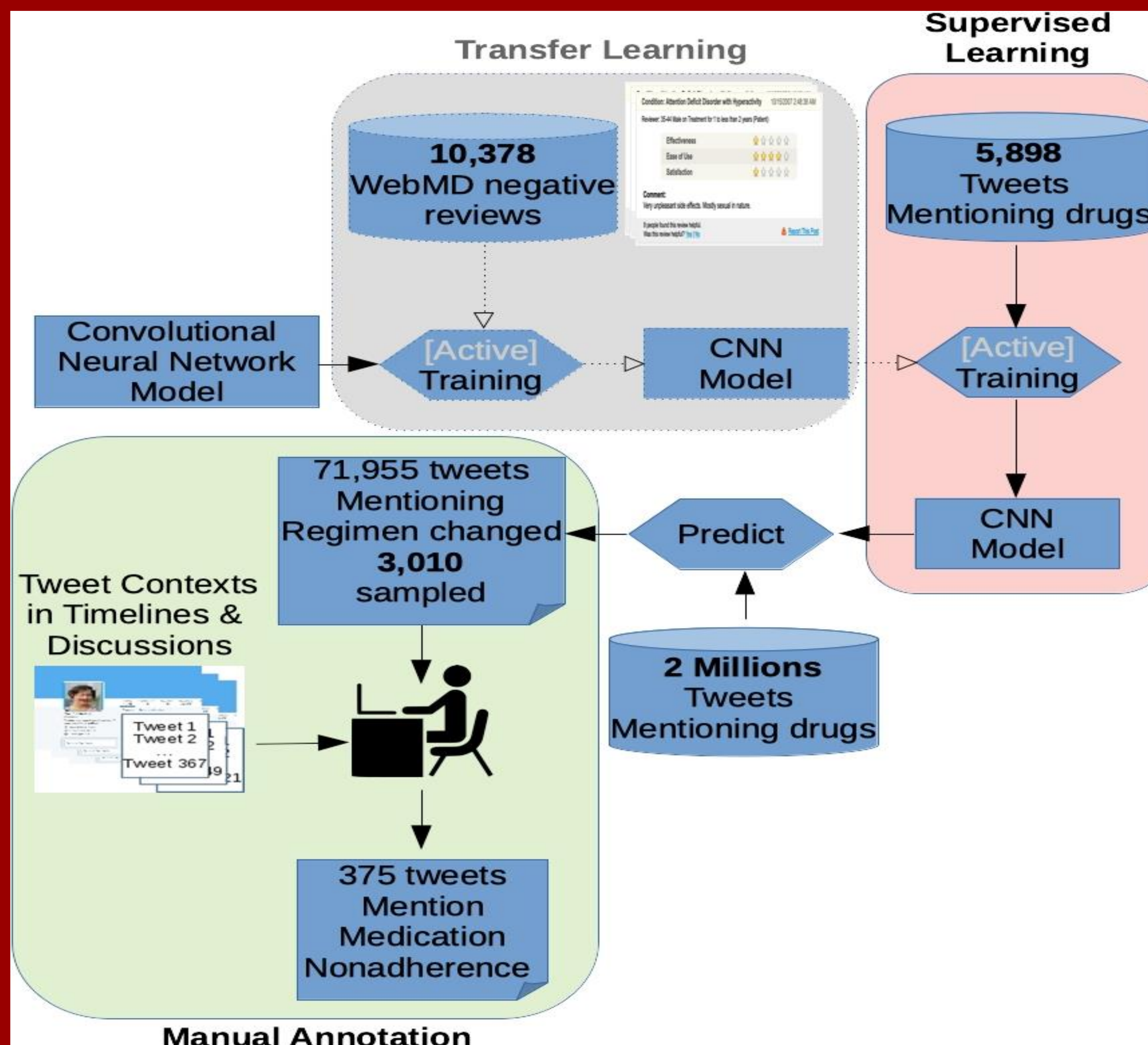
2. Classifiers trained on WebMD reviews and knowledge transferred to Twitter corpus, active learning reducing training set

3. Manual analysis of 3010 tweets with a high probability to mention a change in regimen to find nonadherence and the reasons

RESULTS



From semi-automatic analysis of Twitter posts, we can learn why patients do not adhere to their treatments.



Challenge and solutions

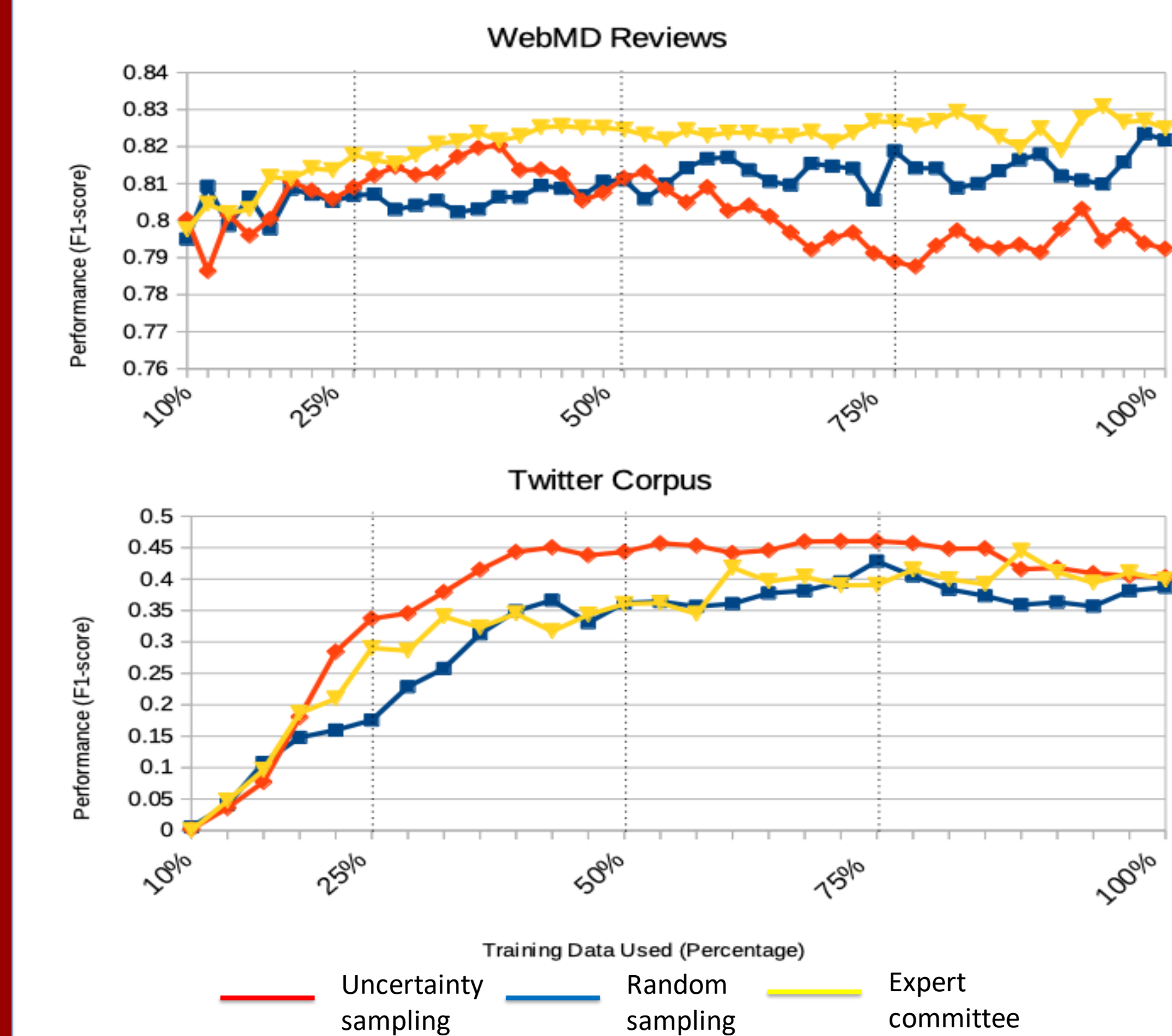
- ❑ Mentions of Nonadherence are rare: 0.68% in tweets mentioning statins [Golden et al. 2020]
- We searched for changes in medication regimen and not only for nonadherence
- We reduced the number of training examples using Transfer and Active learning

Classification of changes in medication regimen

Systems performance on the Twitter Corpus test data (2,300 tweets, 208+/2152-, IAA = 0.649 κ)

Systems	P	R	F1
Without Transfer			
Regular expressions	45.3	41.4	43.2
Random sampling	50.8	34.1	40.4
Uncertainty sampling	39.3	56.2	45.5
Expert Committee (5 CNNs)	51.7	34.7	41.3
With Transfer			
Random sampling	53.6	40.9	46.2
Uncertainty sampling	46.5	52.4	48.4
Expert Committee (5 CNNs)	56.2	45.8	50.4

Reducing training dataset with active learning



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