VOOGO: A SEARCH TOOL FOR CLINICAL DATA

Qing Zeng-Treitler, Doug Redd

VA Salt Lake City

INTRODUCTION

- Increasing amount of data in clinical repositories

    - VINCI (30 million patients and 1.8 billion notes)

- Increasing need to direct access and analyze clinical

- Simple queries often result in high false positives and false negatives

VOOGO FEATURES

- ▶ Text and structured data search
- ▶ Multiple views of results
    - ▶ Summary
   - ▶ Patient
    - ▶ Document
- ▶ Query suggestion

EVALUATION #1

- 300 notes from post- traumatic stress disorder (PTSD) patients
- 300 notes from diabetes mellitus (DM) patients
- 12 topics (e.g. suicide ideation, or diet/exercise)
- Clinician review
  - 0: Irrelevant, 1: Possibly relevant, and 2:Defintiely relevant

EVALUATION #1

- ▶ 19 queries
- ▶ 3 query expansion methods
- ▶ Baseline method: sum of TFIDF
- ▶ 4 performance measures
  - ▶ Precision (positive predictive value)
  - ▶ Recall (sensitivity)
  - ▶ F-measure (the harmonic mean of precision and recall)
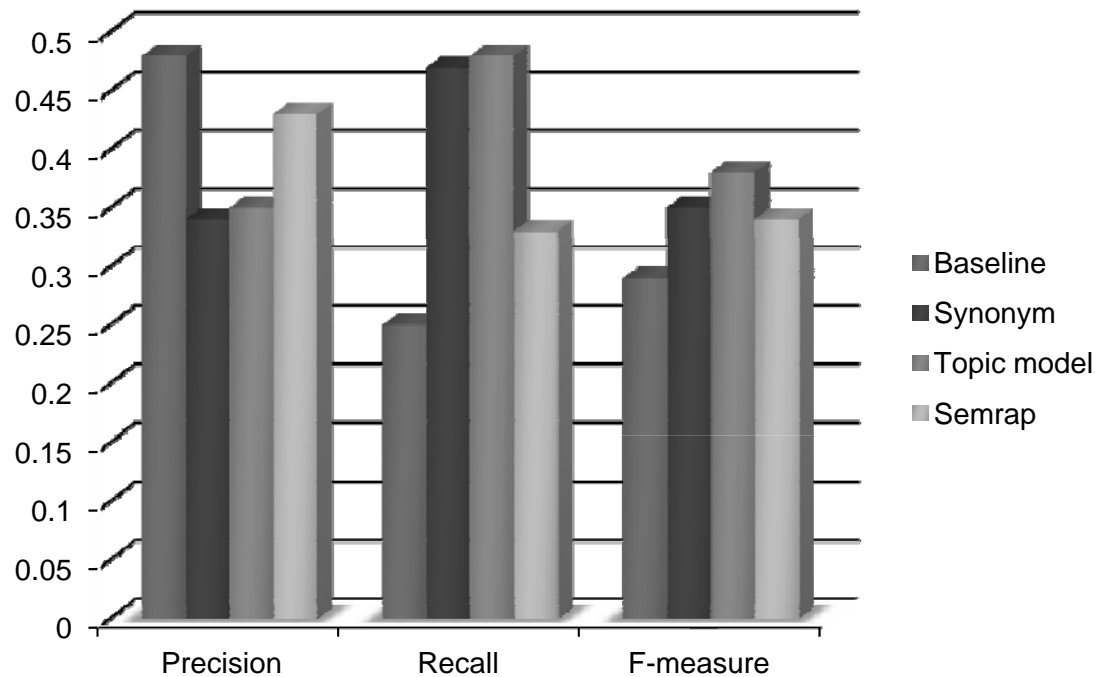 - ▶ P10 (top 10 ranked documents)

RESULTS

Treating Possibly Relevant as Relevant
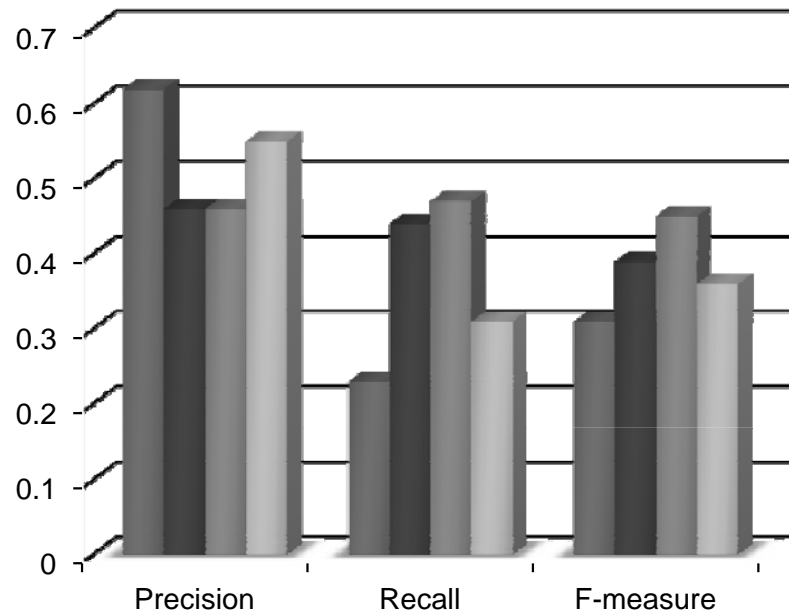
Legend: Baseline, Synonym, Topic model, Semrap

	Precision	Recall	F-measure
Baseline	0.62	0.23	0.31
Synonym	0.46	0.44	0.39
Topic model	0.46	0.47	0.45
SemRep	0.55	0.31	0.36

RESULTS

Treating Possibly Relevant as Irrelevant

	Precision	Recall	F-measure
Baseline	0.48	0.25	0.29
Synonym	0.34	0.47	0.35
Topic model	0.35	0.48	0.38
SemRep	0.43	0.33	0.34

RESULTS
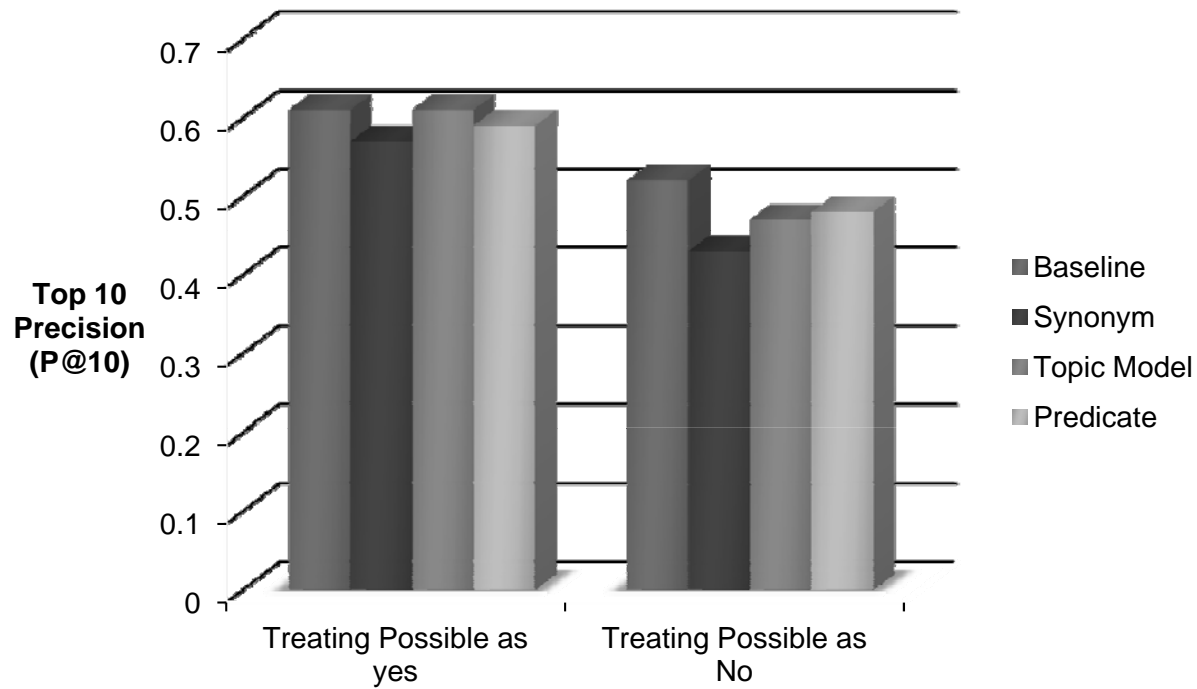
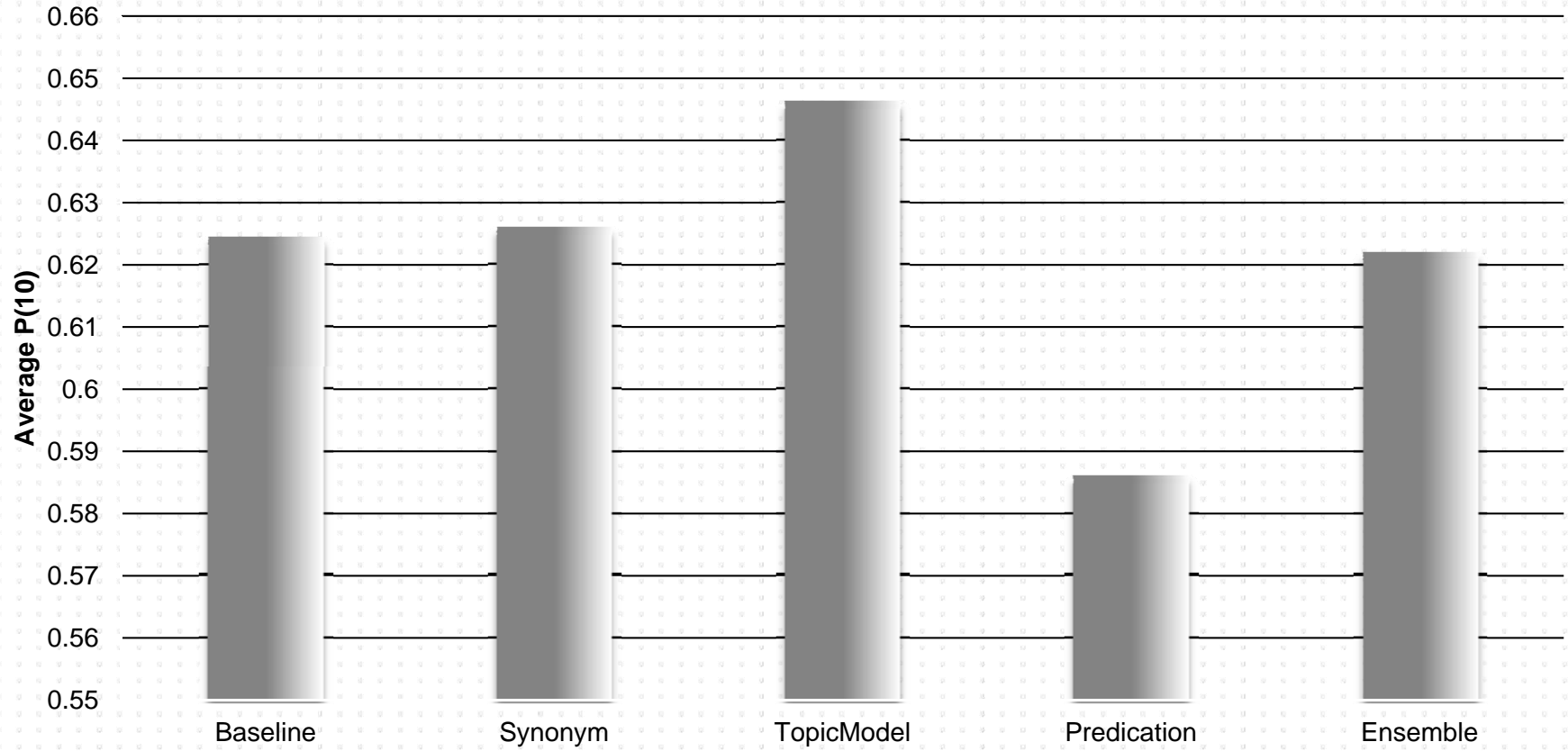|	Baseline	Synonym	Topic Model	Predicate
Treating Possible as yes	0.61	0.57	0.61	0.59
Treating Possible as No	0.52	0.43	0.47	0.48

EVALUATION #2

- ▶ 19 queries
- ▶ 3 query expansion methods and one ensemble method
- ▶ Baseline method: sum of TFIDF
- ▶ 4 performance measures
  - ▶ MAP (Mean average precision)
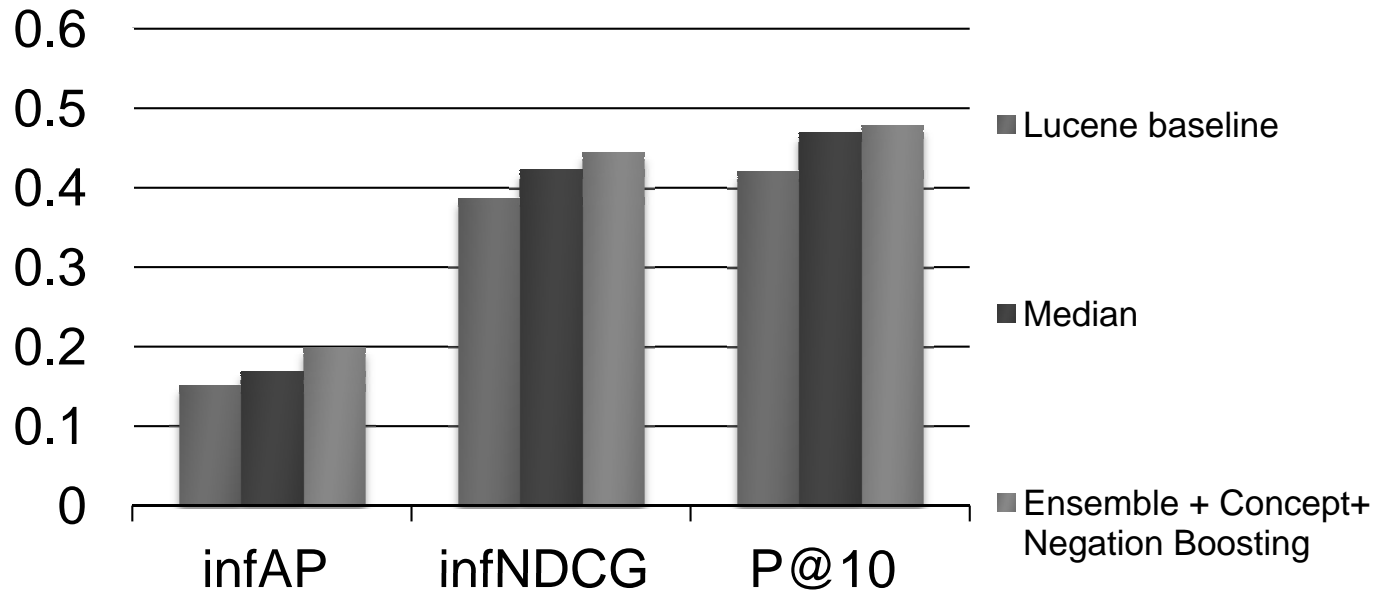 - ▶ P10

MEAN AVERAGE PRECISION
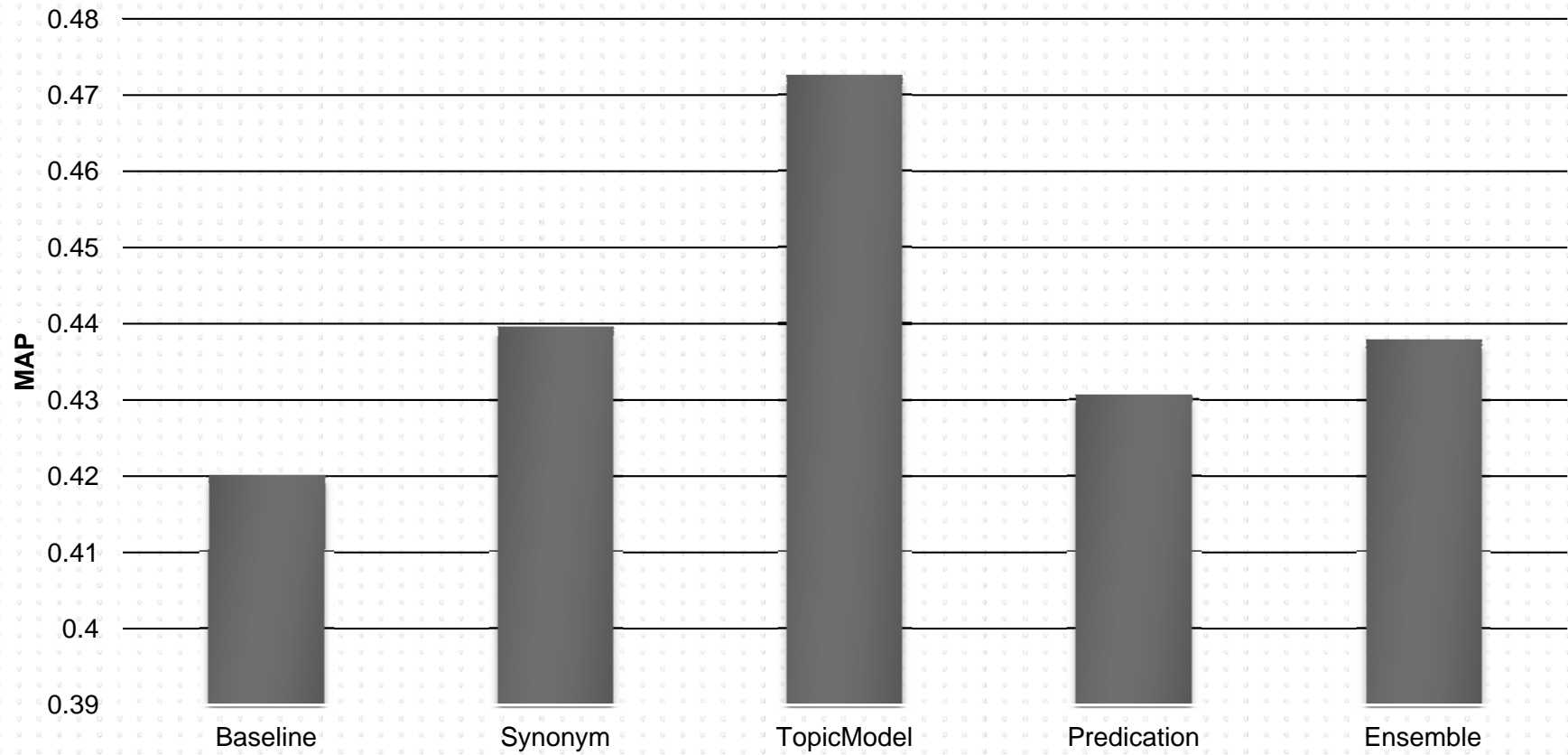
P10

EVALUATION #3

- ▶ 50 queries (TREC)
- ▶ 100k documents
- ▶ Expansion methods
- ▶ Concept indexing and negation filtering
- ▶ Baseline method: Lucene
- ▶ 4 performance measures
  - ▶ infAP (Inferred Average Precision)
  - ▶ infNDCG (Inferred Normalized Discounted Cumulated Gain)
  - ▶ R-prec (R-precision)
  - ▶ P10

RESULTS

	infAP	infNDCG	P@10
Lucene baseline	0.152	0.388	0.421
Median	0.170	0.424	0.470
Ensemble + Concept + Negation Boosting	0.200	0.445	0.479

FUTURE STEPS

- ▶ More structured fields
- ▶ Complex text criteria
- ▶ Temporal search support
- ▶ Concept indexing
- ▶ Intelligent Visual analytics

ACKNOWLEDGEMENT

CONTACT US

- Q.t.zeng@utah.edu
- Doug.redd@utah.edu