2014 i2b2/UTHealth NLP Shared Tasks

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Past Challenges

- De-identification
- Smoking Status
- Obesity
- Medications
- Concepts, assertions, relations
- Coreference resolution
- Temporal relations

Data for Past Challenges

- One record per patient

2014 Data

- 1,304 longitudinal records from 297 patients in the diabetes datamart
- Thanks to Drs. Stan Shaw and Vishesh Kumar

2014 Tasks

- De-identification
- Progression of CAD risk factors in diabetic patients
- NLP software usability assessment
- Novel data use

De-identification

De-identification

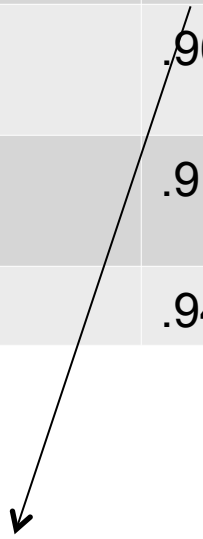
- 18 HIPAA-defined categories of information to be removed from the records
- Extra categories: doctor and hospital names, professions, all locations, all parts of dates, all ages

De-identification Participants

- 10 teams
  - 9 university teams, 1 corporate
  - 5 countries: USA, China, UK, France, Canada

De-identification Results

	Min	Mean	Median	Max	Std. Dev.
Micro Precision	.527	.872	.920	.964	.121
Micro Recall	.242	.717	.794	.909	.212
Micro F1	**.382**	**.774**	**.845**	**.936**	**.180**
Macro Precision	.566	.872	.921	.965	.113
Macro Recall	.267	.720	.794	.916	.215
Macro F1	.411	.777	.845	.940	.179



Comparable number in 2006 was 0.967

All PHI: Instance-based:

Rank	Team Name	Micro Precision	Micro Recall	Micro F1
1	University of Nottingham	0.9645	0.9092	**0.9360**
2	Harbin Institute of Technology: Shenzhen Graduate School	0.9264	0.8988	**0.9124**
3	University of Manchester	0.9306	0.8836	**0.9065**
4	Harbin Institute of Technology	0.9229	0.8505	**0.8852**
5	Kaiser Permanente	0.8731	0.7700	**0.8183**
6	LIMSI–CNRS	0.8937	0.7332	**0.8055**
7	Memorial University of Newfoundland	0.7944	0.7191	**0.7549**
8	East China Normal University	0.9344	0.4288	**0.5878**
9	California State University San Marcos	0.7628	0.3526	**0.4823**
10	UC San Diego	0.5271	0.3825	**0.4433**

All PHI, Token-based:

Rank	Team name	Micro Precision	Micro Recall	Micro F1
1	University of Nottingham	0.9815	0.9414	**0.9611**
2	University of Manchester	0.9655	0.9316	**0.9482**
3	Harbin Institute of Technology Shenzhen Graduate School	0.9549	0.9384	**0.9466**
4	Harbin Institute of Technology	0.9571	0.9051	**0.9304**
5	Kaiser Permanente	0.9397	0.8609	**0.8986**
6	LIMSI–CNRS	0.9321	0.7783	**0.8483**
7	Memorial University of Newfoundland	0.8629	0.8038	**0.8323**
8	East China Normal University	0.9498	0.5399	**0.6885**
9	California State University San Marcos	0.9010	0.4753	**0.6223**
10	UC San Diego	0.7164	0.4939	**0.5847**

Progression of CAD Risk Factors in Diabetic Patients

Progression of CAD Risk Factors in Diabetic Patients

- Categorize temporality of heart disease risk factors and their indicators
  - Present before, during, after, or some combinations of those relative to date of record (document creation time, DCT)

Progression of CAD Risk Factors in Diabetic Patients

- Risk factors and indicators
  - CAD and diabetes
  - Hyperlipidemia/hypercholesterolemia, high LDL measurements
  - Hypertension, high blood pressure
  - Obesity, high BMI
  - Family history of premature CAD
  - Being a smoker
  - Relevant medications

Progression of CAD Risk Factors in Diabetic Patients Participation

- 20 teams
  - 14 university teams, 6 corporate/ government teams
    - Linguamatics, Mayo Clinic, Kaiser Permanente, …
  - 6 countries: US, China, UK, Taiwan, France, South Korea,

Progression of CAD Risk Factors in Diabetic Patients Results

	Min	Mean	Median	Max	Std. Dev.
Micro Precision	.455	.808	.852	.913	.119
Micro Recall	.203	.835	.908	.969	.175
Micro F1	**.305**	**.815**	**.872**	**.928**	**.145**
Macro Precision	.455	.800	.849	.914	.121
Macro Recall	.258	.834	.904	.968	.162
Macro F1	.365	.812	.870	.928	.137

Rank	Team name	Micro Precision	Micro Recall	Micro F1	Macro Precision	Macro Recall	Macro F1
1	NLM	0.8951	0.9625	0.9276	0.8965	0.9611	0.9277
2	Harbin Institute of Technology Shenzhen Graduate School	0.9106	0.9436	0.9268	0.9119	0.9399	0.9257
3	Kaiser Permanente	0.8972	0.9409	0.9185	0.8998	0.9429	0.9209
4	Linguamatics and Northwestern University	0.8975	0.9375	0.9171	0.8989	0.9361	0.9171
5	University of Nottingham	0.8847	0.9488	0.9156	0.8885	0.9411	0.9141
6	The Ohio State University	0.8907	0.9261	0.9081	0.8916	0.9248	0.9079
7	TMUNSW	0.8594	0.9387	0.8973	0.8551	0.9368	0.8941
8	National Central University	0.8586	0.9256	0.8909	0.8518	0.9231	0.8860
9	University of Manchester	0.8557	0.9007	0.8776	0.8575	0.8956	0.8762
10	University of Utah	0.8552	0.8951	0.8747	0.8494	0.8914	0.8699

Software Usability Assessment

Software Usability Assessment

- Purpose: evaluate i2b2 challenge software usability
- Open to all current and prior i2b2 challenge participants who have developed systems on any of the i2b2 datasets since 2006

Software Usability Assessment

- Taken on by our colleagues
  - Dr. Hua Xu from UTHealth
  - Dr. Kai Zheng from Michigan
    - Class project

Novel Data Use

Novel Data Use

- To encourage the use of i2b2 data for research outside the scope of de-identification and CAD tasks

Novel Data Use Participation

- 5 teams
- Topics:
  - Identifying medication side effects
  - Risk assessment using the Framingham risk score
  - Risk factor visualization
  - Eligibility criteria resolution
  - Predicting changes in systolic blood pressure

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