CAS drives and empowers the development of partnerships between IBM, clients and the scientific community, in order to uncover mutually beneficial growth opportunities.
Watson MD

• Adapt Watson to Medical QA
• Mainly an NLP task
• NLP technologies need human-annotated data for training, testing, evaluation

• The human annotation task is one of semantic interpretation
Crowd Watson

- **Crowdsourcing gold standard data for**
  - Training Watson in medical domain
  - Extraction of newspaper events

- **Crowdsourcing for Domain Adaptation**
  - How to rapidly acquire knowledge for new domains, e.g. medical, water

- **Platforms**
  - CrowdFlower & Amazon Mechanical Turk
  - Crowdsourcing Games with a Purpose
people don't always agree...

Harnessing disagreement...
Crowd Truth

Annotator disagreement is signal, not noise. It is indicative of the variation in human semantic interpretation of signs, and can indicate ambiguity, vagueness, over-generality, etc.
MSc projects: Crowdsourcing Process

• **Medical sub-question & answer evaluation**
  – Using the crowd to evaluate the quality of sub-questions generated by Watson 2.0

• **Generating Question-Answer pairs for medical and other domains**
  – Using the crowd to generate meaningful questions and their corresponding answers from an existing (open) textual corpus

• **Identifying Negation expressions in text**
  – Using the crowd to find synonym phrases / passages with negation

• **Extracting medical factors and relations**
  – Using the crowd to identify medical terms, their types and relations in text
Dr. Detective

combining gamification techniques and crowdsourcing to create a gold standard in medical text

In the following text, find all the clues that could help diagnose *malignant melanoma, invasive to 0.9 mm, with metastasis to one of two sentinel lymph nodes.*

**Step 1:** Select the type of clue you are looking for.

**Factors**

**Step 2:** To pick a clue, highlight all the words that describe it by clicking on them.

On physical examination, the patient appeared healthy, and the vital signs were normal. There was a **3-mm linear scar on the left upper posterior arm**, with **no residual pigmented lesion** and **no satellite nodules**. No other **suspicious pigmented lesions** were identified. There was **no palpable lymphadenopathy**. The remainder of the examination was normal.

**Show clues by others**

- 3-mm linear scar on the left upper posterior arm (1)
- no satellite nodules (1)
- no residual pigmented lesion (1)
- no palpable lymphadenopathy (1)

**Step 3:** After all the words in the clue are highlighted, save the clue.

**Step 4:** After you found all the clues for **Factors**, submit them.

**Submit your clues for Factors**

**Step 5:** Go back to step 1 and select another clue type, or move on to the next diagnosis.

[Next diagnosis >>]
MSc projects: Visual Analytics of Crowdsourcing Data

• **Measure Quality of Annotation (Crowd) Data**
  – Define metrics for crowdsourcing workers
  – Define metrics for data, e.g. sentences, factors, relations
  – Use metrics to define data filters

• **Visualizing Large Quantities of Annotation Data**
  – Experiment with different / alternative / complementary visualizations of annotation data
  – Specify (user groups & their goals) requirements to work with such analytics
MSc projects: Applying Crowdsourcing Results

• **Adapting Machine Learning to Crowd Truth**
  – for medical relation extraction
  – for medical factor extraction
  – experimenting with collected crowdsourced gold standard data

• **Adapting OpenSource Watson to Crowd Truth**
  – focusing on relation extraction & factor identification
  – experimenting with collected crowdsourced gold standard data
MSc project: Event Extraction & Image Annotation

• Adapting Crowd-Watson framework to
  – Event extraction from newspapers
  – Image & Video Annotation (with general entities)
  – Image & Video Annotation (with events)

• Experimenting with state of the art event extraction tools
  – to complement & improve crowdsourcing process
MSc project: Semantic Search: Waterworks & Roads

- **Adapting Crowd-Watson framework to Information Extraction in Waterworks & Roads Domain**
  - Experiment both with Crowd & Experts
  - Identifying relevant vocabularies
  - Defining micro-tasks within Crowd-Watson
  - Connecting water-related data in Dutch Water domain

- **Adapting existing Semantic Search to Waterworks & Roads Domain**
  - Identify relevant paths in the structured data
  - Define relevant ranking & clustering of the search results