



IBM WATSON  
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# Intent Classification from Unlabeled Dataset

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## Business Problem

Businesses can customize Watson Assistant to recognize common requests (intents) that their customers frequently make. IBM invests a lot of energy into helping its clients train chatbots that are specific to their businesses. Our work falls into this effort.

In terms of machine learning, we want to empower IBM business users to train a *classifier* to recognize each of their customer intents. Text classification traditionally requires an extensive labeled data set of examples, but this places a burden upon IBM's business users. Hand-labeling requires hundreds of hours of manual labor and can only be done by a subject matter expert.

## Our Solution

Our capstone aims to use machine learning to most efficiently tap into the subject matter expertise of an IBM business user, such that a quality custom classifier can be produced from an unlabeled dataset. We develop a browser-based process, in which the machine honors the time constraints of the user. It does this by surfacing the most relevant words and phrases to the user and then adapting to the user's response. The human and machine work together until the user is satisfied.

## Data: Customer Utterances

When training Watson Assistant, business users provide data sets of customer chat logs. IBM provided its own, containing 55,000 customer utterances with nine commonly-occurring intents.

Matched with IBM Watson  
and received the project  
(2018 Feb)

Offsite: Data Exploration, Preliminary Analyses and  
Logic Development  
(2018 Feb - May)

Onsite: Logic & Methods Developments  
(2018 May - July)

Onsite: Browser App Development  
(2018 July - Aug)

Internal & External Presentations  
(2018 Aug)

## Intent Understanding Tool

Intent:

"Why am I seeing a charge? I have a free account."

User Specifies Intent

User Defines, Explores, and Refines Intent

Probabilistic Labels Generated

Text-Classifier Trained on Probabilistic Labels

Verified Terms

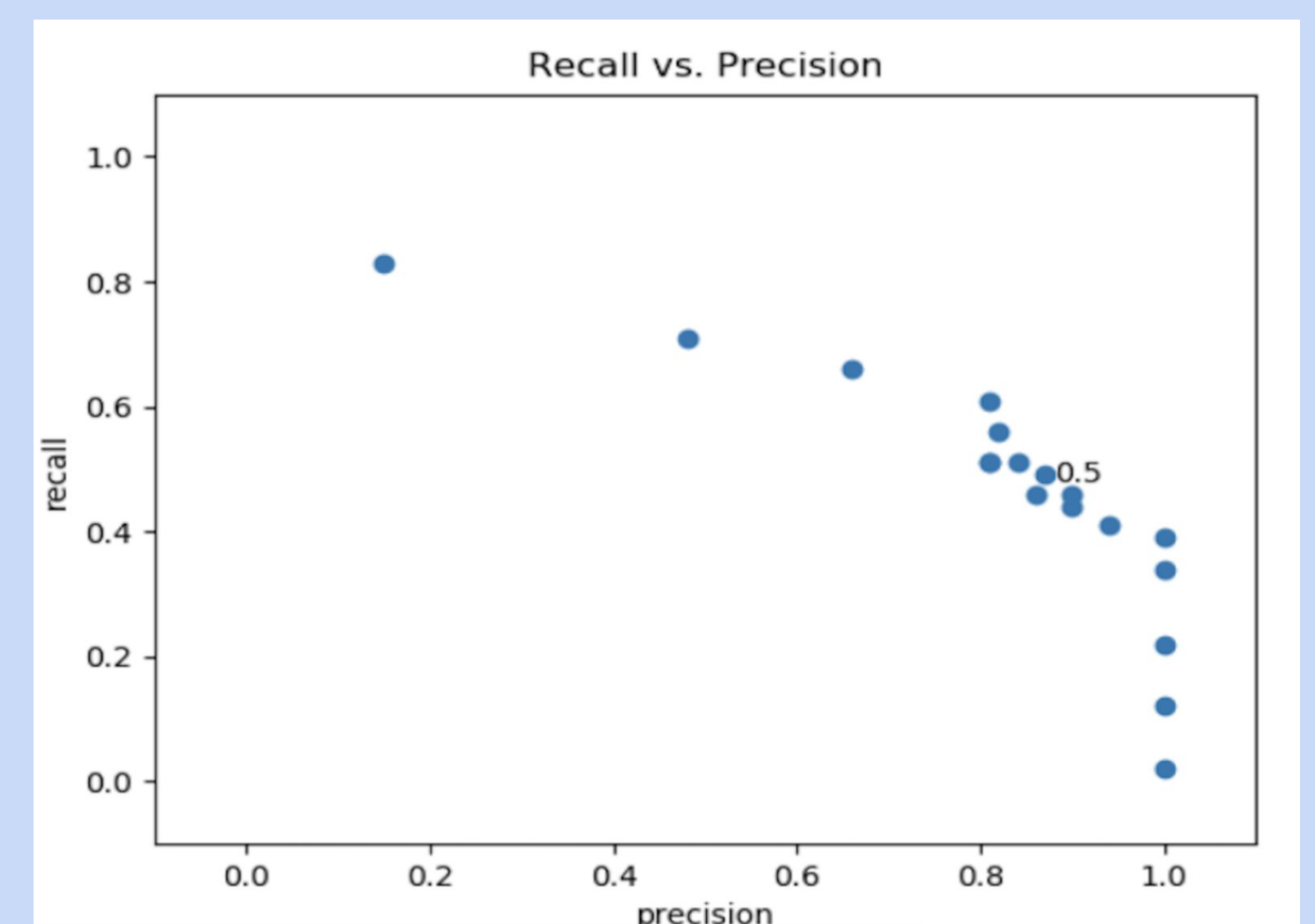
Significant Terms  
(Elastic-search)

Similar Terms  
(Word2Vec)

Most Relevant Terms

User Curate

## Results



Results for Why-Free-Charge Intent (Above)

We transformed dozens of hours of hand-labeling into a 20-minute, low-cognitive-load experience leading to labels that carve out the user's idea of the intent's boundary.

In my last ticket about the bill you promised to credit my account, but that has not happened.

Why does my dashboard show a bill? I should have free credit left.

- After the words and phrases are grouped, the machine uses heuristics to "vote" on whether the intent is present.

- The votes of each utterance are synthesized into a single *probability*, which acts as the training label.



wisdom of the crowd