



Complaint Assistant

Helping companies predict
complaint escalation

Hao Lin

Dalton Chiscolm Lawsuit: Man Sues Bank Of America For “1,784 BILLION, TRILLION Dollars”



Problem

Complaint Escalation

- Huge money loss
- Lose customers
- Ruin reputation



After a positive customer experience:

- 69% would recommend the company to others
- 50% would use the business more frequently



After a negative experience:

- 58% will never use the company again
- 49% will tell friends not to use the business
- 34% would take revenge by posting a review online or sharing a poor experience on social media

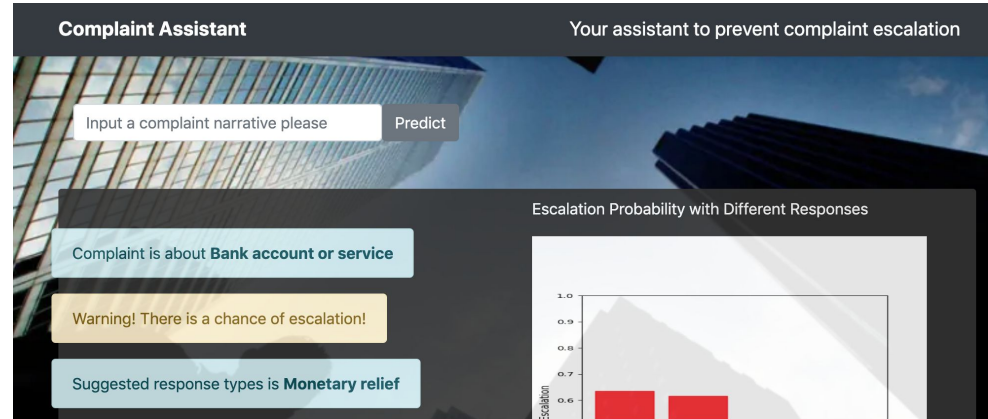
Product

Developed a Web app

- Categorize the product type of the complaint
- Predict the chance of complaint escalation
- Suggest best response type to prevent escalation

 **Complaint Assistant**

www.complaintassistant.best





Complaint

I have a complaint regarding the overdraft fees that were billed to my checking account. I have a complaint regarding the overdraft fees that were billed to my checking account. I was charged XXXX overcharge fees for XXXX withdrawals in which I had funds in the account. I contact your office and spoke with a representative who credited me with XXXX of the fees back. However, the XXXX fee was never credited. I just do n't understand how I can billed for an overdraft fee when the funds were in my accounts. I contacted the office of the president for Flagstar Bank and my complaint was pushed aside. Flagstar has now filed a writ of garnishment with my employer.

Complaint Assistant

Your assistant to prevent complaint escalation

Predict



Your assistant to prevent complaint escalation

Predict

Try it

balala

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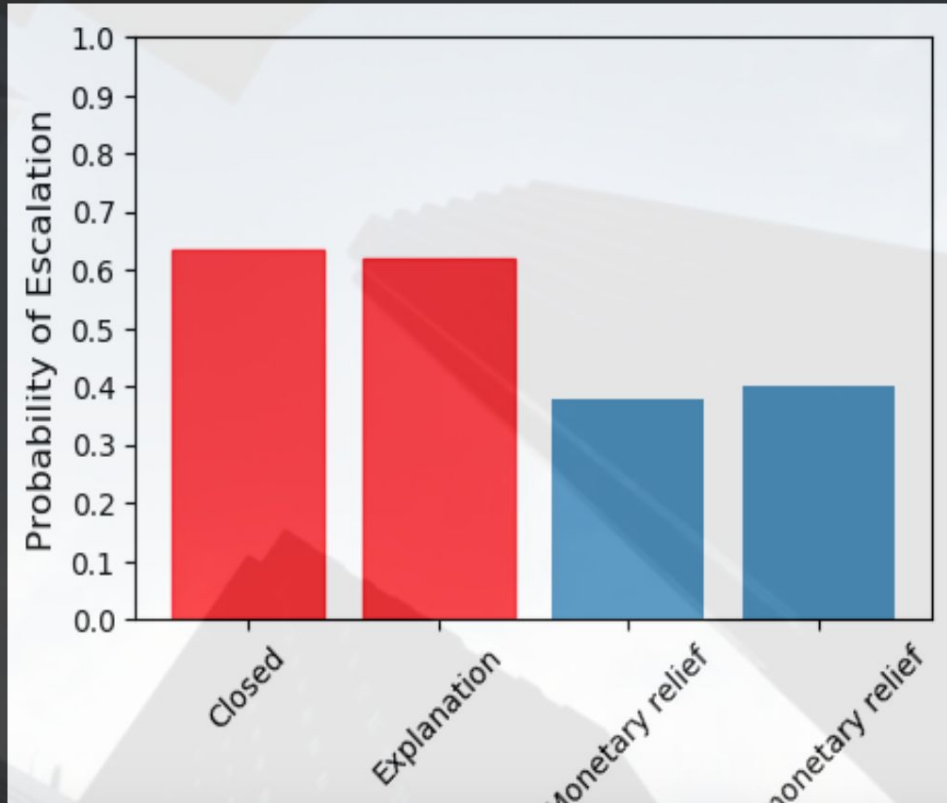
Click to go forward, hold to see history

Complaint is about **Bank account or service**

Warning! There is a chance of escalation!

Suggested response types is **Monetary relief**

Escalation Probability with Different Responses

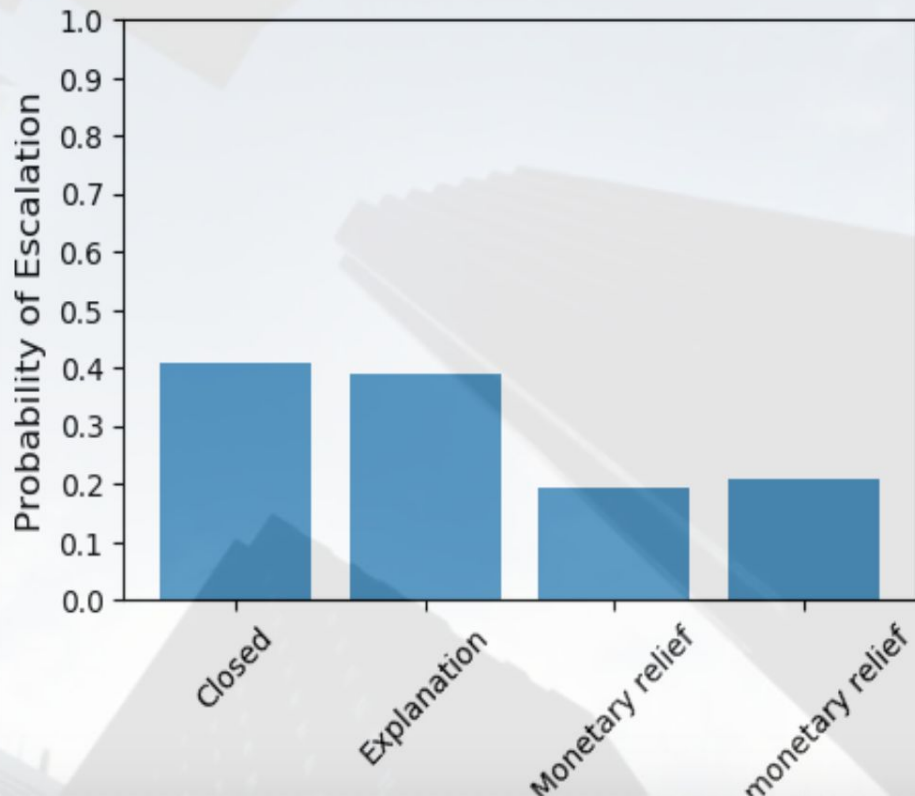


Complaint is about **Debt collection**

There will probably be no escalation.

Suggested response types is **Non-monetary relief**

Escalation Probability with Different Responses





Data : 160k Historical Consumer Complaints



Consumer Tools

Practitioner Resources

Data & Research

Policy & Cor

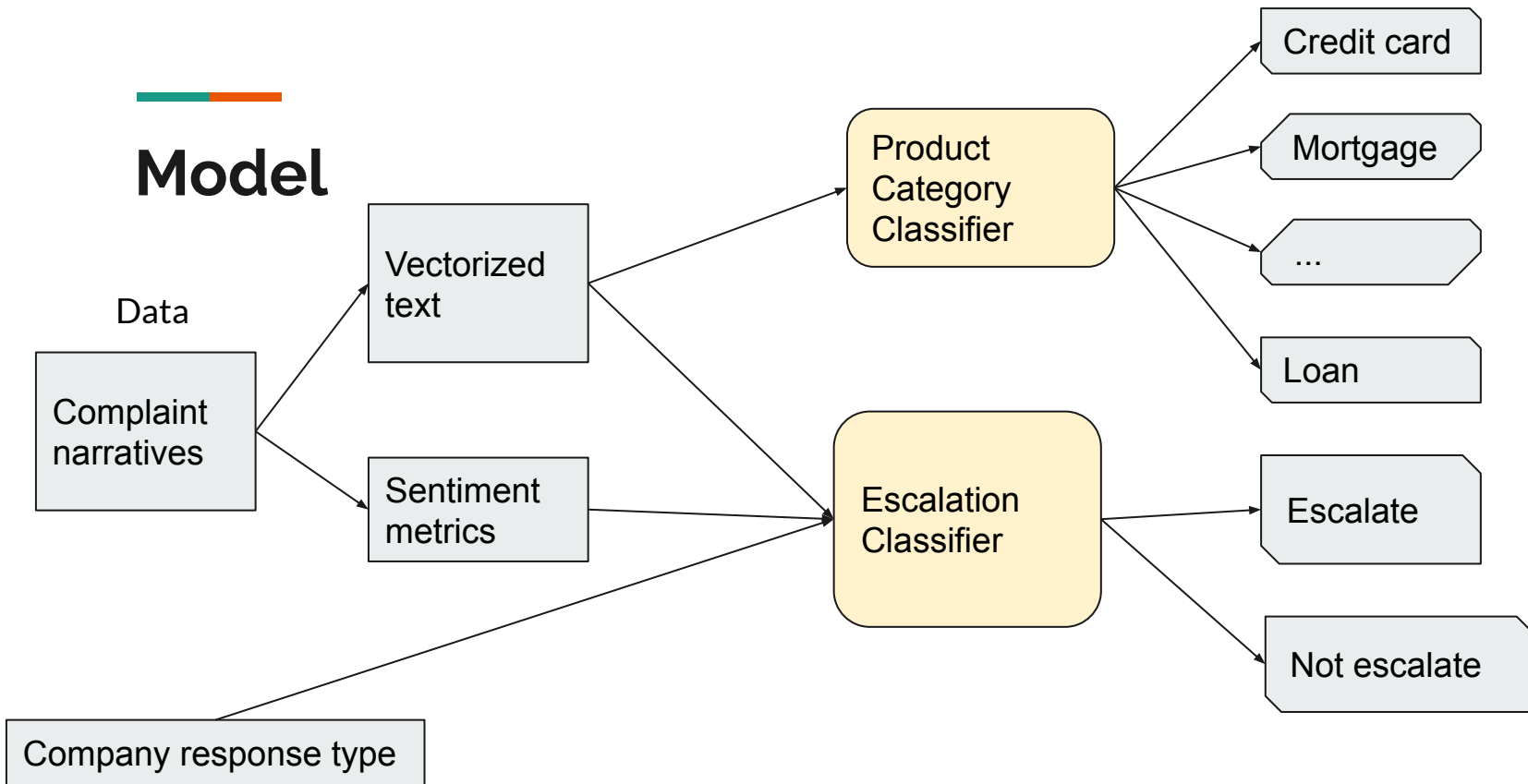
Consumer Complaint Database ^{BETA}

Consumer complaints are added to this public database after the company has responded to the complaint, confirming a commercial relationship with the consumer, or after they've had the complaint for 15 calendar days, whichever comes first. We don't verify all the facts alleged in complaints, but we do give companies the opportunity to publicly respond to complaints by selecting responses from a pre-populated list. Company-level information should be considered in the context of company size and/or market share.

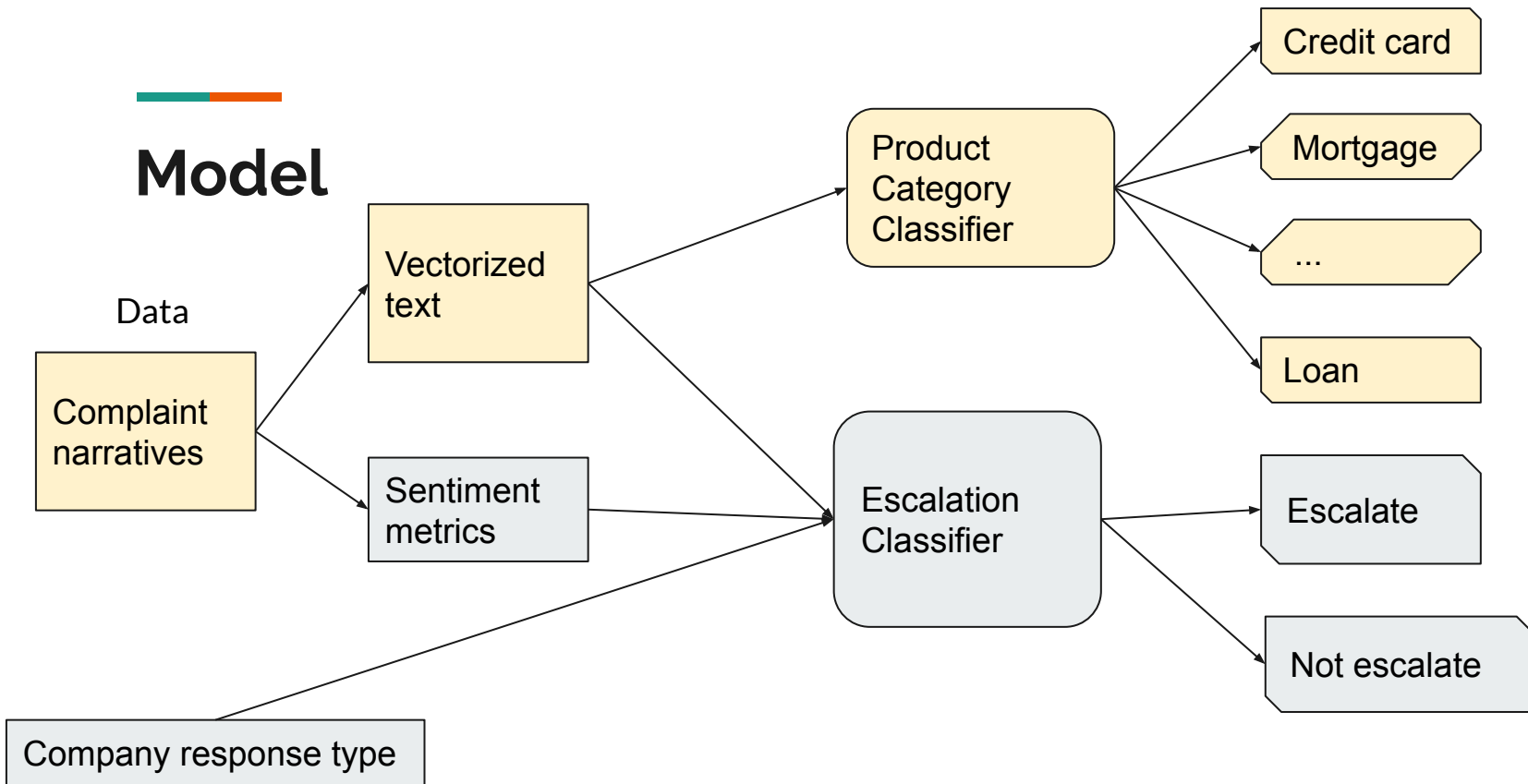
complaints about financial products

- Labeled (Dispute Yes / No)
- Narratives
- 13 product categories
- Company responses

Model



Model



Model

Tokenization
Lemmatization
Stopword
Tf-idf
vectorization

Data

Complaint
narratives

Vectorized
text

Sentiment
metrics

Product
Category
Classifier

Escalation
Classifier

Credit card

Mortgage

...

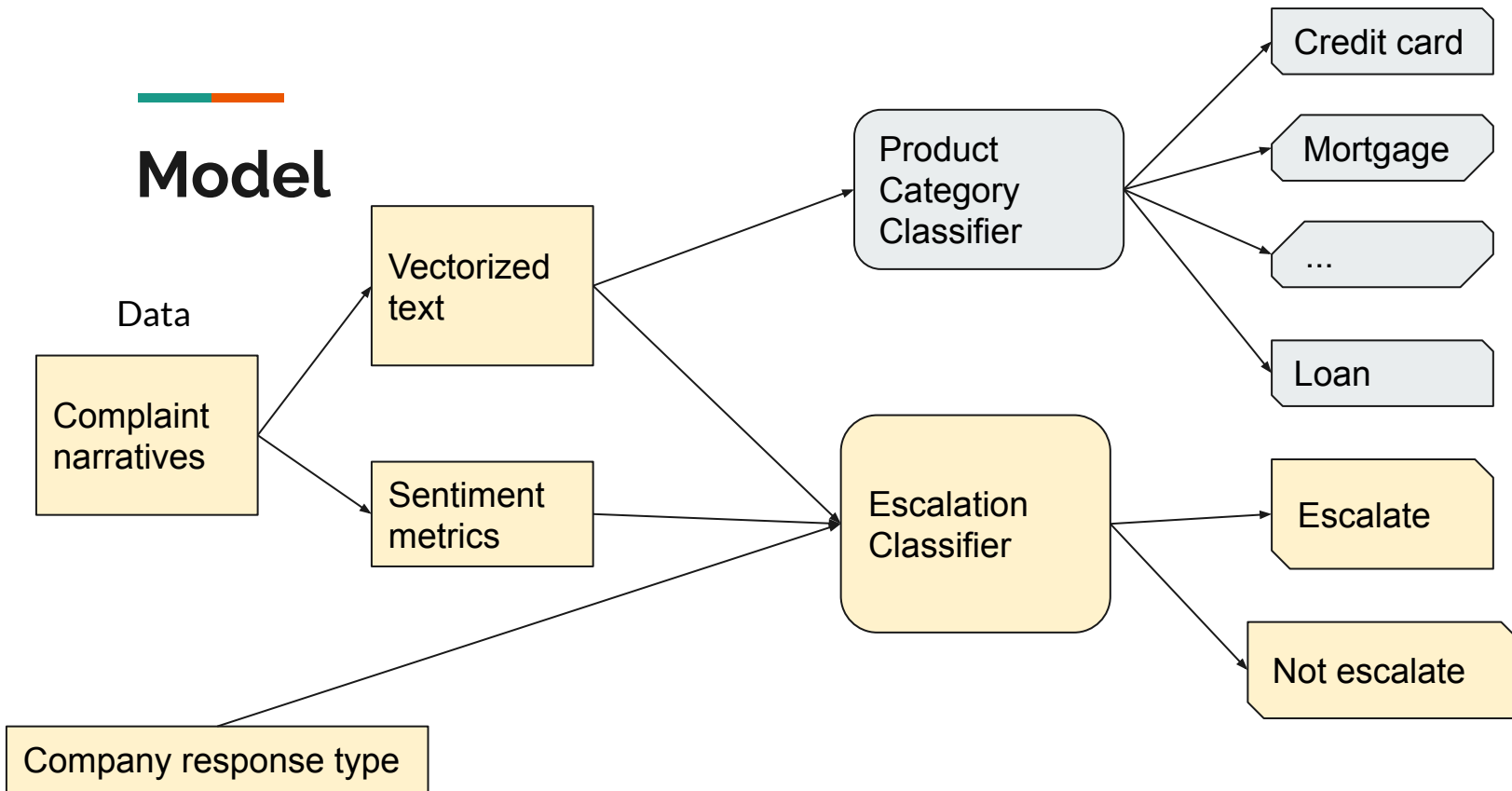
Loan

Escalate

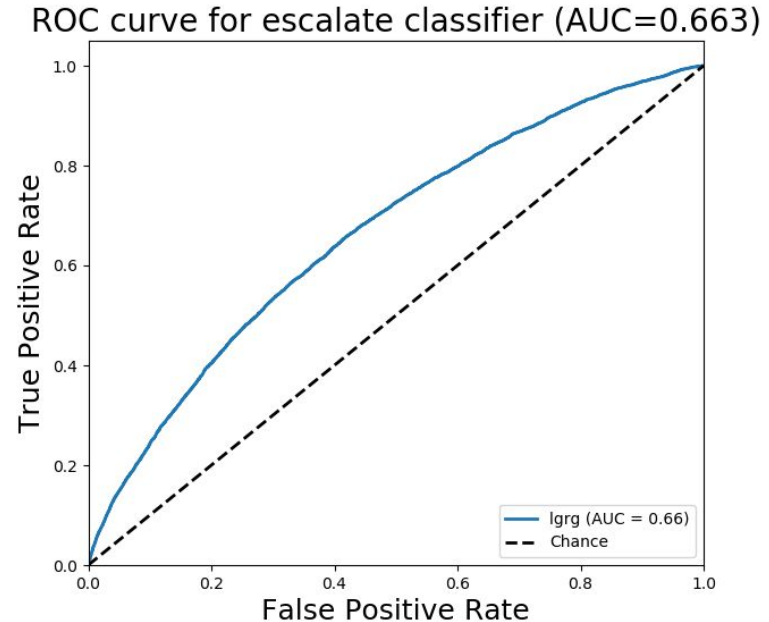
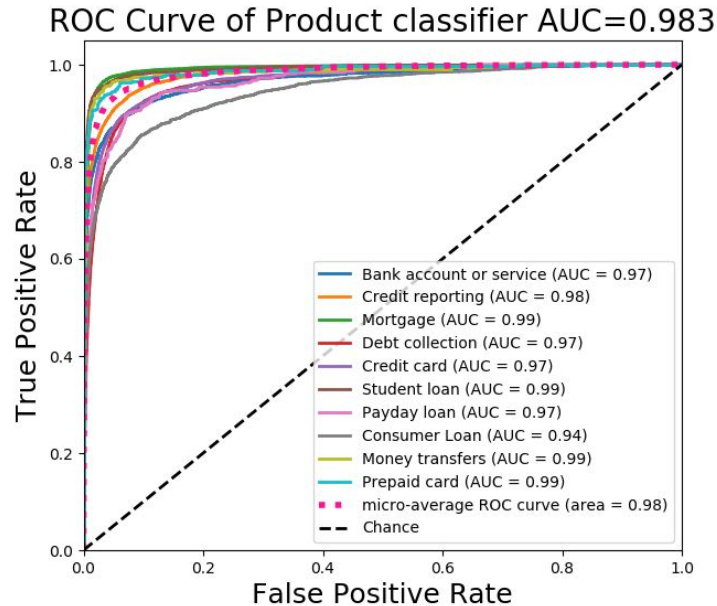
Not escalate

Company response type

Model



ROC Curve and AUC score for two classifier





Top 20 important features of escalate classifier

- **tcpa** - Telephone Consumer Protection Act
- **american express** highest dispute rate in the EDA result
- **Refuse, false, failed, request investigate, illegal, violated**
- Thank, husband ??



Validation

Validate using 1000 recently submitted complaints

- 63% escalation are detected (152 / 240)
- All except one are suggested to adopt a response different from current response

Half of the escalation could have been avoided !!



Conclusion

Complaint Assistant

- Leveraged by NLP and machine learning
- Could be customized to specific company

Other Application

- Product category classifier -> Customer segmentation
- Imbalanced data -> Fraud detection



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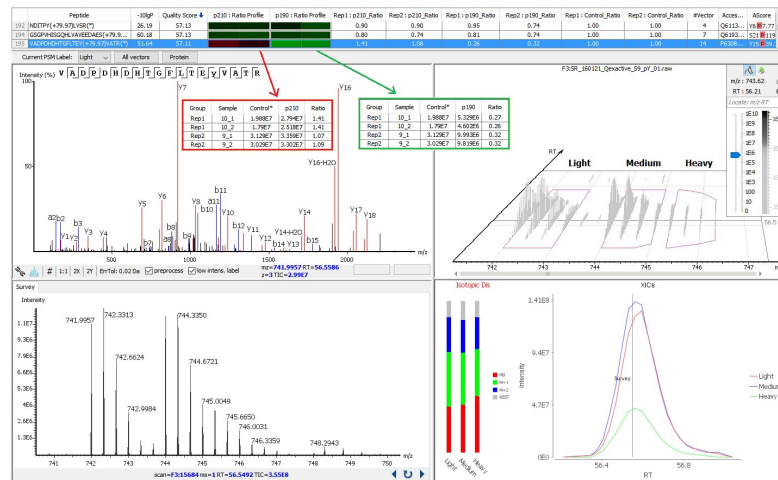
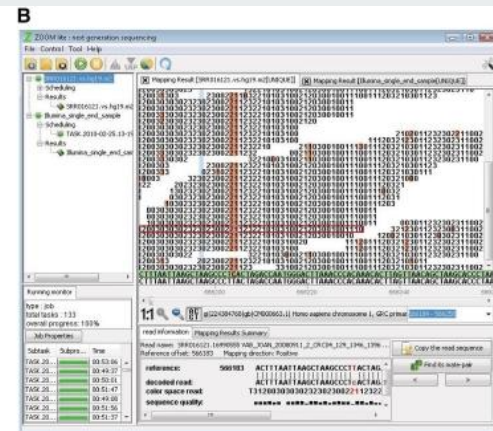
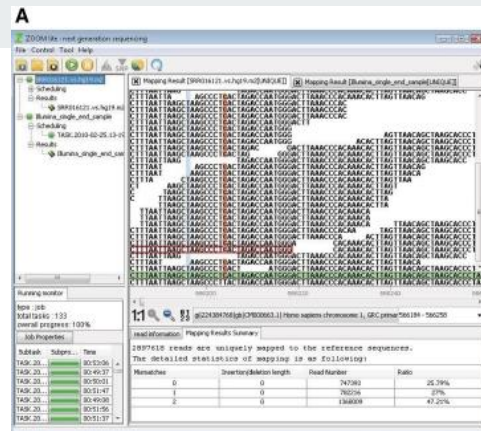
PhD in Computer Science



中国科学院
CHINESE ACADEMY OF SCIENCES



UNIVERSITY OF
WATERLOO





NLP processing of narrative

Tokenization

Stop word

- Combine two stop word library (nltk and sklearn.feature_extraction)
- Remove stop words with strong sentiment. Eg. shouldn't, never

Lemmatization

TF-IDF vectorization (ngram=(1,3) max_feature_num = 50000



Sentiment Metrics for each narrative

Based on sentiment score generated by Vader for each sentence

- # of sentences
- # of words
- the most negative score
- Negative ratio
- sum of sentiment score
- average sentiment score
- # of ?
- # of !



Future Plans

More accurate sentiment analysis

- Train sentiment analysis model other than using Vader as base

Incorporate more semantic information

- Fine tune doc2vec
- Bi-LTSM

Generate dangerous word library

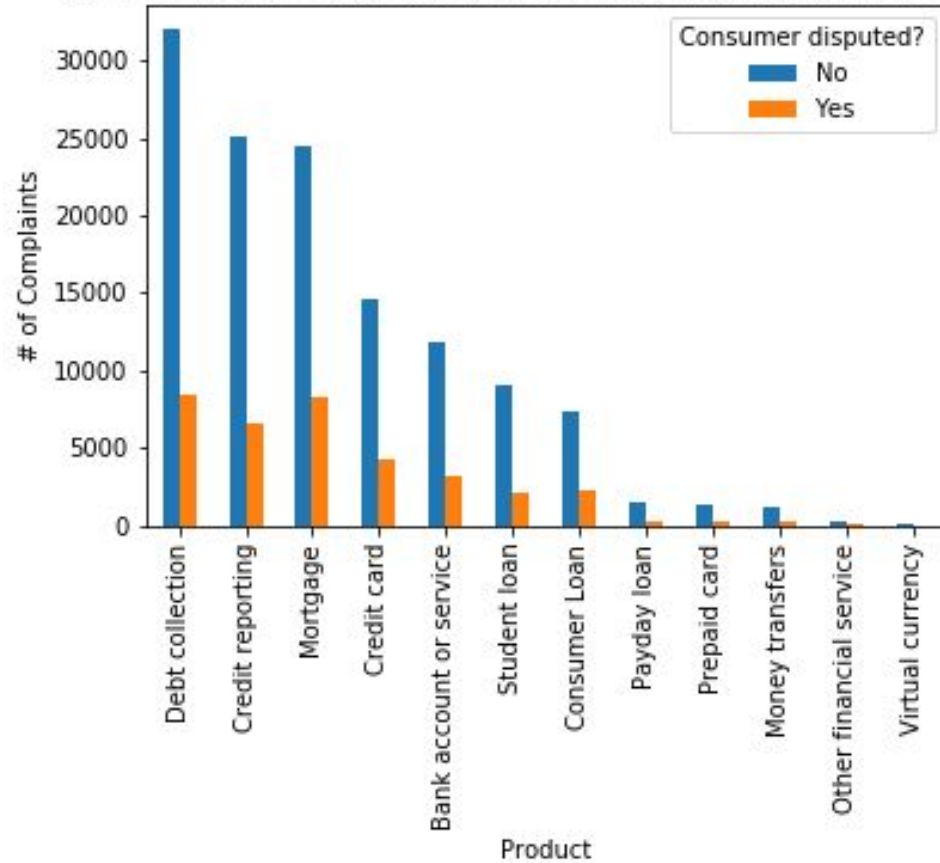


Customer complaint content and sentiment

'credit card number : XXXX set up automatic payment to " Pay amount due on due date \'\' for this Bank of America Visa Card (under XXXX XXXX XXXX). However, on XXXX, only minimum payment of {\$25.00} was deducted. This resulted in I being charged interest on XXXX (and potentially future date), and potentially affect my credit score. I contacted BOA but it is a mess there. I was being directed here and there with no resolution. \n**The mistake is unexcusable.** My family have all kind of credit cards and **have never seen a mistake like this.** I like BOA to:1. **correct his promptly** and refund any penalty interest charged. \n2. **explain to CFPB** why this happen and how many customers have been affected by this mistake, **how much fee they have collected out of this mistake.** \n3. explain to me whether this affect my credit score and correct promptly if it does.'

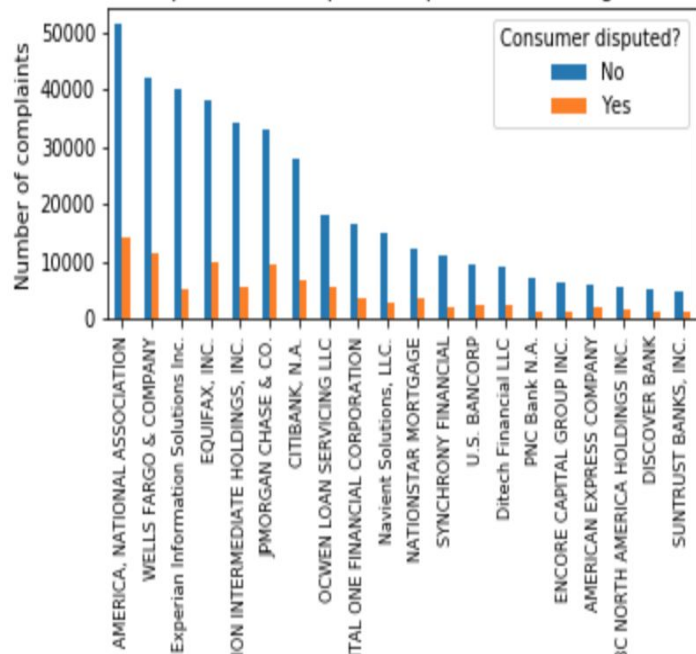
In []:

The bar chart of complaints number in different Product categories

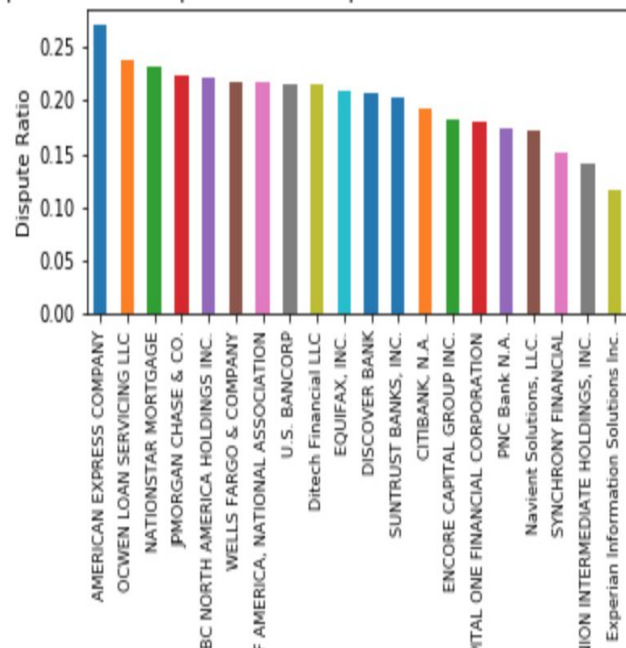


How the company response matters

Number of complaints from top 20 companies containing most complaints



Dispute Ratio of complaints of 20 companies with most number of Complaints



	index	nonzero_coef	nonzero_abs_coef	feature_names
267	44887	7.232970	7.232970	tcpa
245	41143	3.736539	3.736539	scottrade
18	2712	3.416254	3.416254	american express
102	15883	2.989087	2.989087	equifax
270	45104	-2.833702	2.833702	thank
27	3739	2.324839	2.324839	attached
194	32645	-2.195305	2.195305	payday
110	16688	2.187422	2.187422	failed
222	37498	2.123806	2.123806	refuse
49	7282	2.055631	2.055631	cfpb

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111	16799	1.999381	1.999381	false
232	39280	-1.911323	1.911323	request investigate
139	20736	1.848396	1.848396	illegal
96	14516	1.828917	1.828917	discover
291	48291	1.809327	1.809327	violated
53	7735	1.803760	1.803760	chase
138	20579	-1.757667	1.757667	husband
223	37551	1.742846	1.742846	refused
95	14493	1.686402	1.686402	disclosure
147	21864	1.684566	1.684566	inquiry