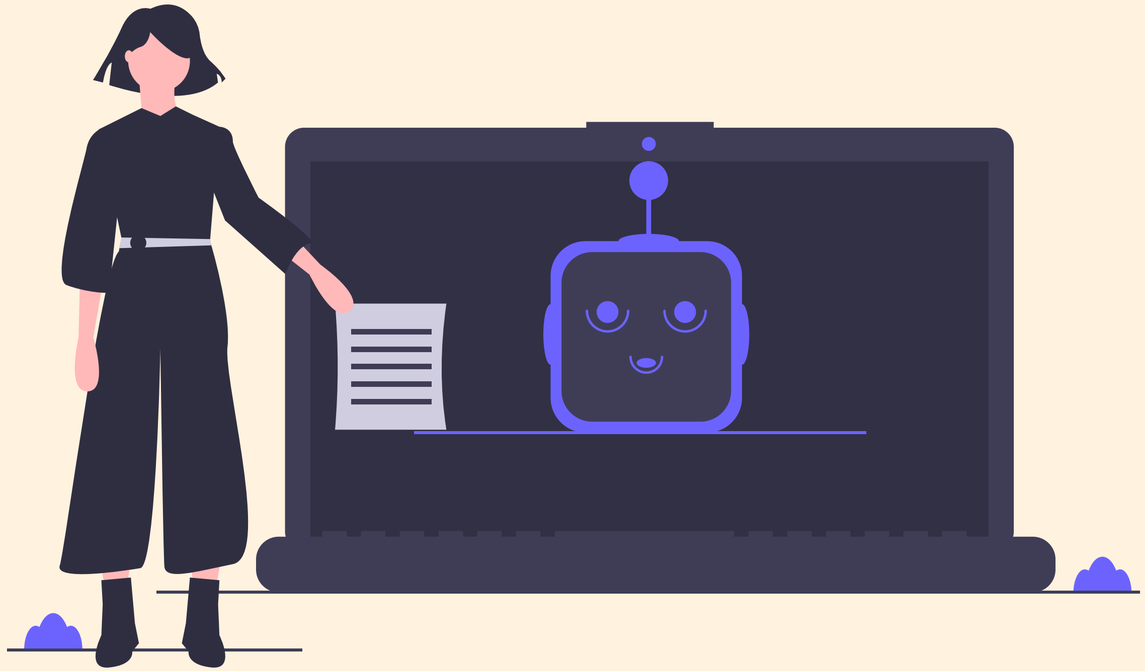


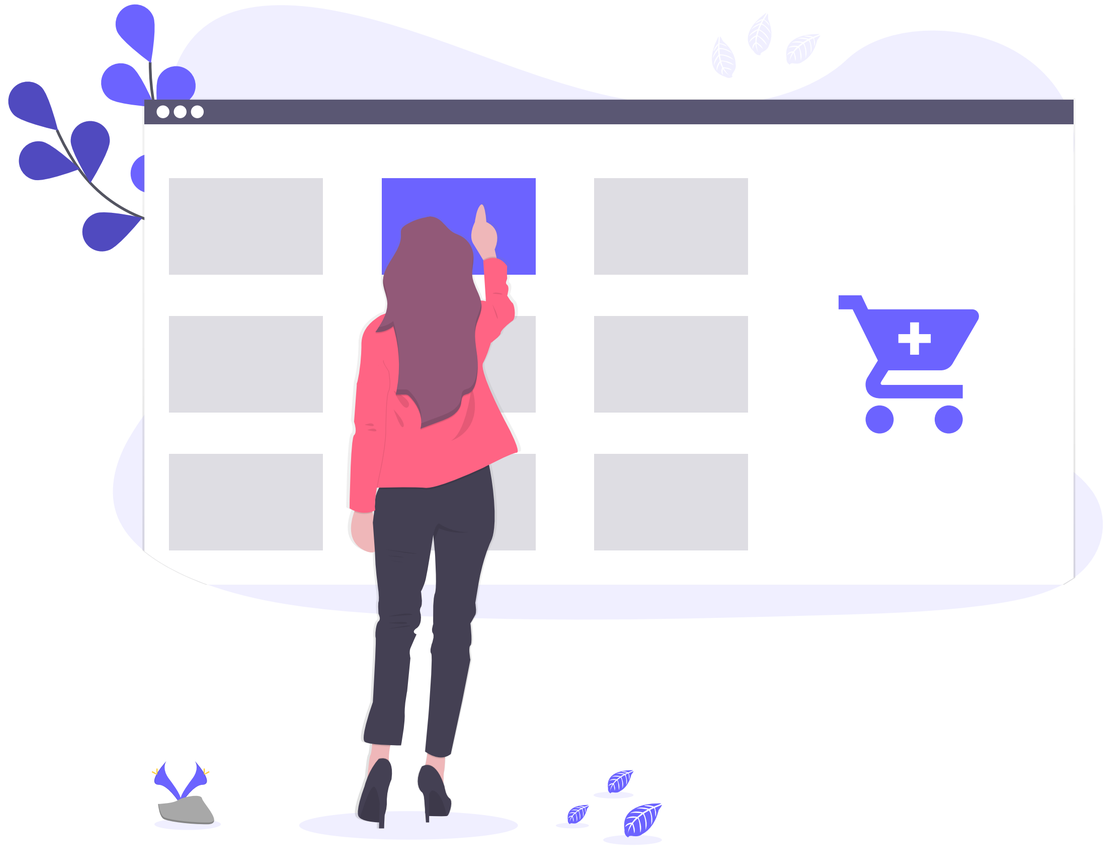
HOLA bert

Streamlining pipeline of e-commerce customer query in chat

by predicting product category and suggesting likely product in question

MOTIVATION

Large Overheads for Customer Service in Consumer Facing Business



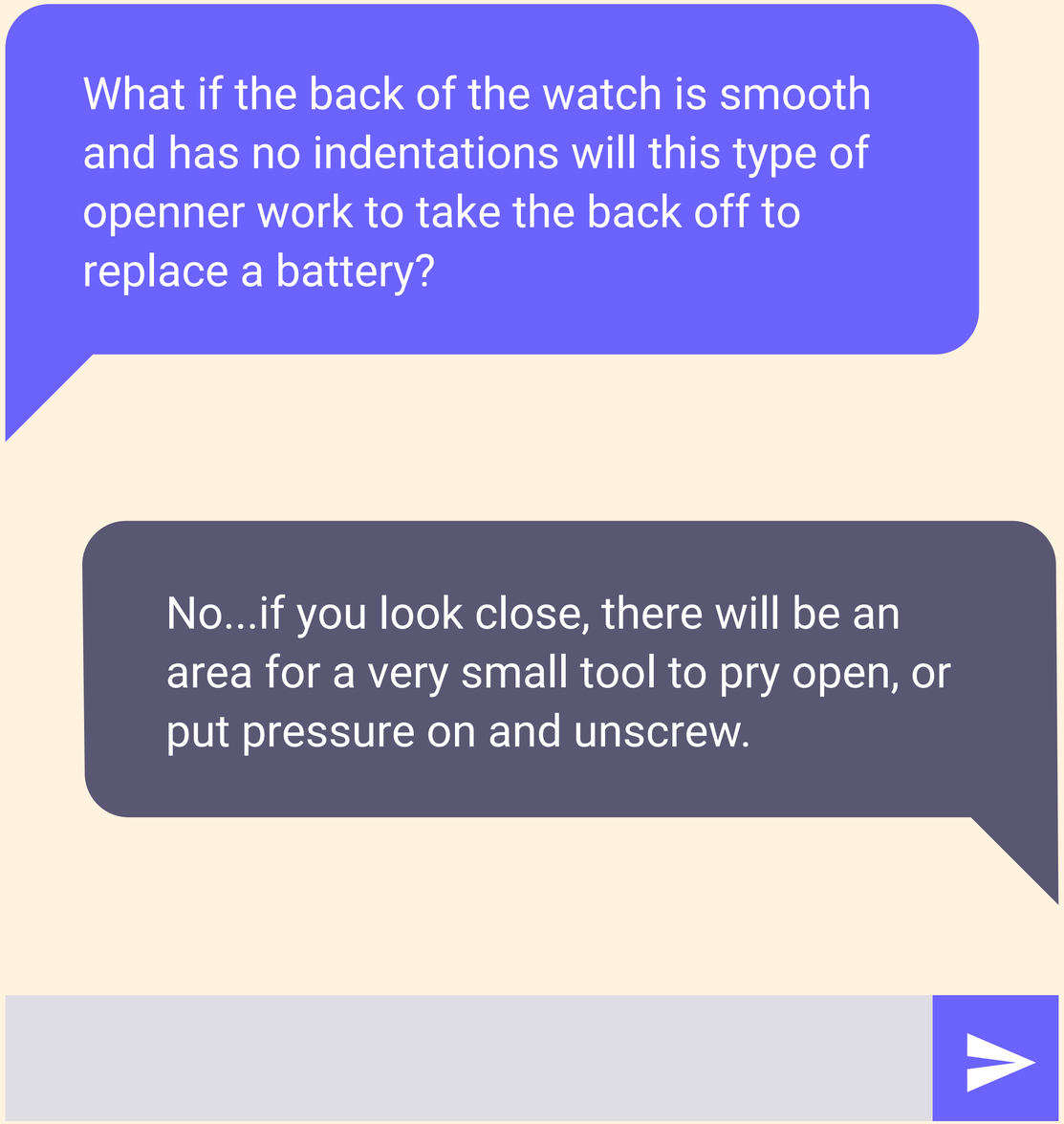
CONTEXT

Amazon Q&A corpus

> 1.3m Questions

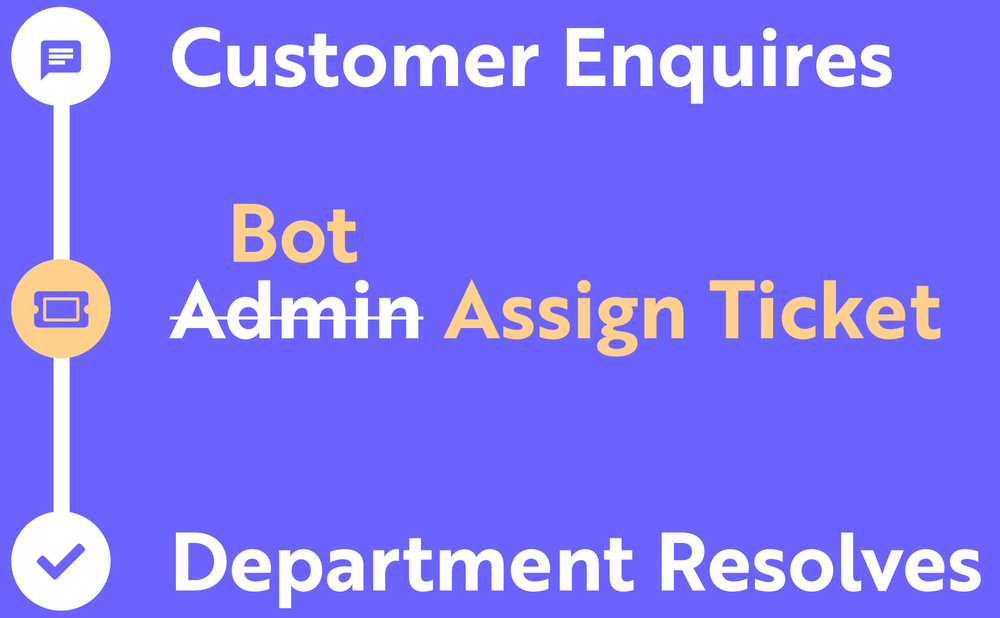
> 180k Products

21 Departments



BUSINESS PROBLEM

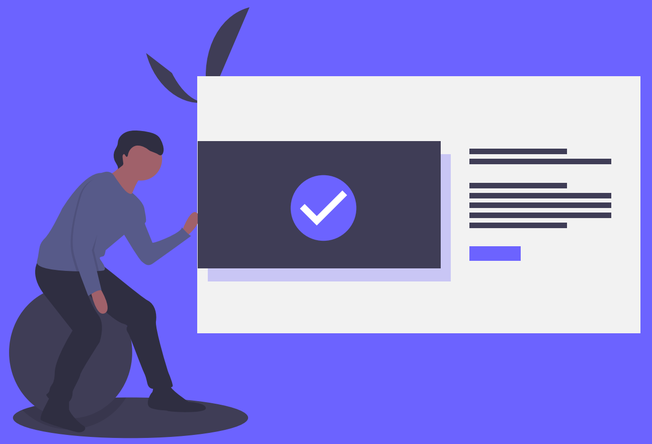
Can enquiry ticketing be handled by bots instead?

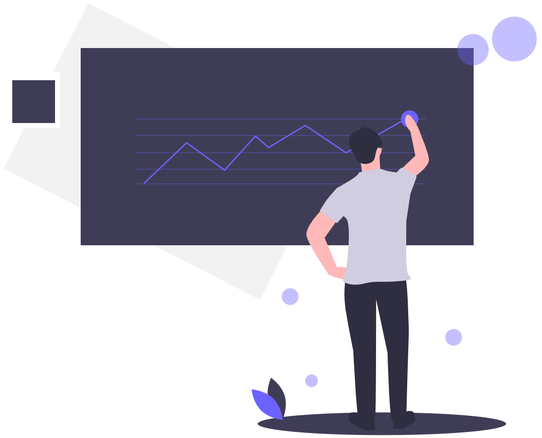


DATA SCIENCE PROBLEM

Natural Language Processing
Supervised
Multi-Classification

Accurately predict which of the 21 target categories a text datum should be



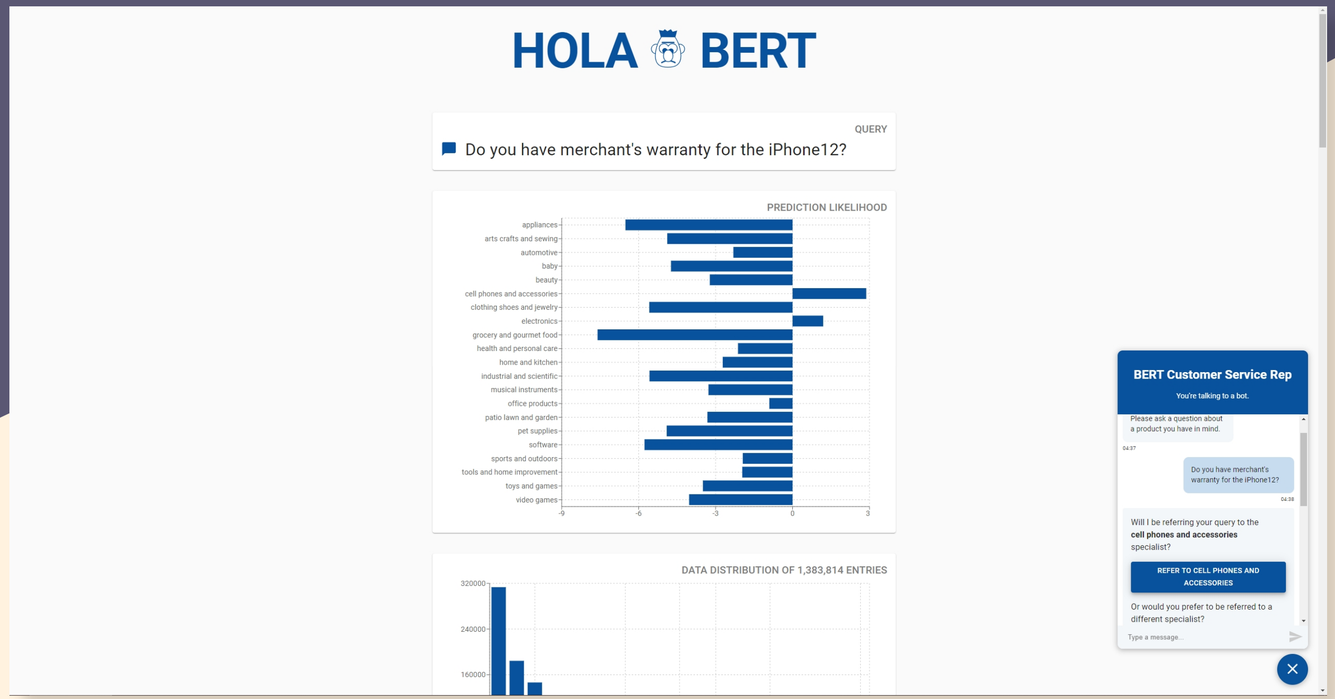


DEPLOYABILITY

USABILITY

PREDICTION

SUCCESS CRITERIA


HOLA BERT
QUERY
Do you have merchant's warranty for the iPhone12?
PREDICTION LIKELIHOOD
appliances
arts crafts and sewing
automotive
baby
beauty
cell phones and accessories
clothing shoes and jewelry
electronics
grocery and gourmet food
health and personal care
home and kitchen
industrial and scientific
musical instruments
office products
patio lawn and garden
pet supplies
software
sports and outdoors
tools and home improvement
toys and games
video games
-9
-6
-3
0
3
DATA DISTRIBUTION OF 1,383,814 ENTRIES
320000
240000
160000
BERT Customer Service Rep
You're talking to a bot.
Please ask a question about a product you have in mind.
04:37
Do you have merchant's warranty for the iPhone12?
04:38
Will I be referring your query to the cell phones and accessories specialist?
REFER TO CELL PHONES AND ACCESSORIES
Or would you prefer to be referred to a different specialist?
Type a message...

PROTOTYPE

USER

"What iPhone color.."

Send Enquiry

Yes it's cell phone.

Confirm / Select Category

Yes it's iPhone.

Confirm / Select Product

CHAT CLIENT

REFER TO CELL PHONES AND ACCESSORIES

Or would you prefer to be referred to a different specialist?

ELECTRONICS

Is your query pertaining to any of these products?

B00FPHBKTS	VIEW
B00IMRHXTY	VIEW
B009B75ZQM	VIEW

SERVER

y = cell_phone

Predict Category

y = iPhone

Predict Product

Connect to Human

Assign Ticket

WHAT IS BERT

Google language model

probabilities of a sequence of words

which uses Transformers

neural net for language sequence

for NLP pre-training

+ to our prediction model for magic

Bidirectional

Encoder

Representations

Transformers

Some text for bert to process

Relates sequence forwards and backwards

Bidirectional

Encoder

Representations

Transformers

What gets encoded is decoded.

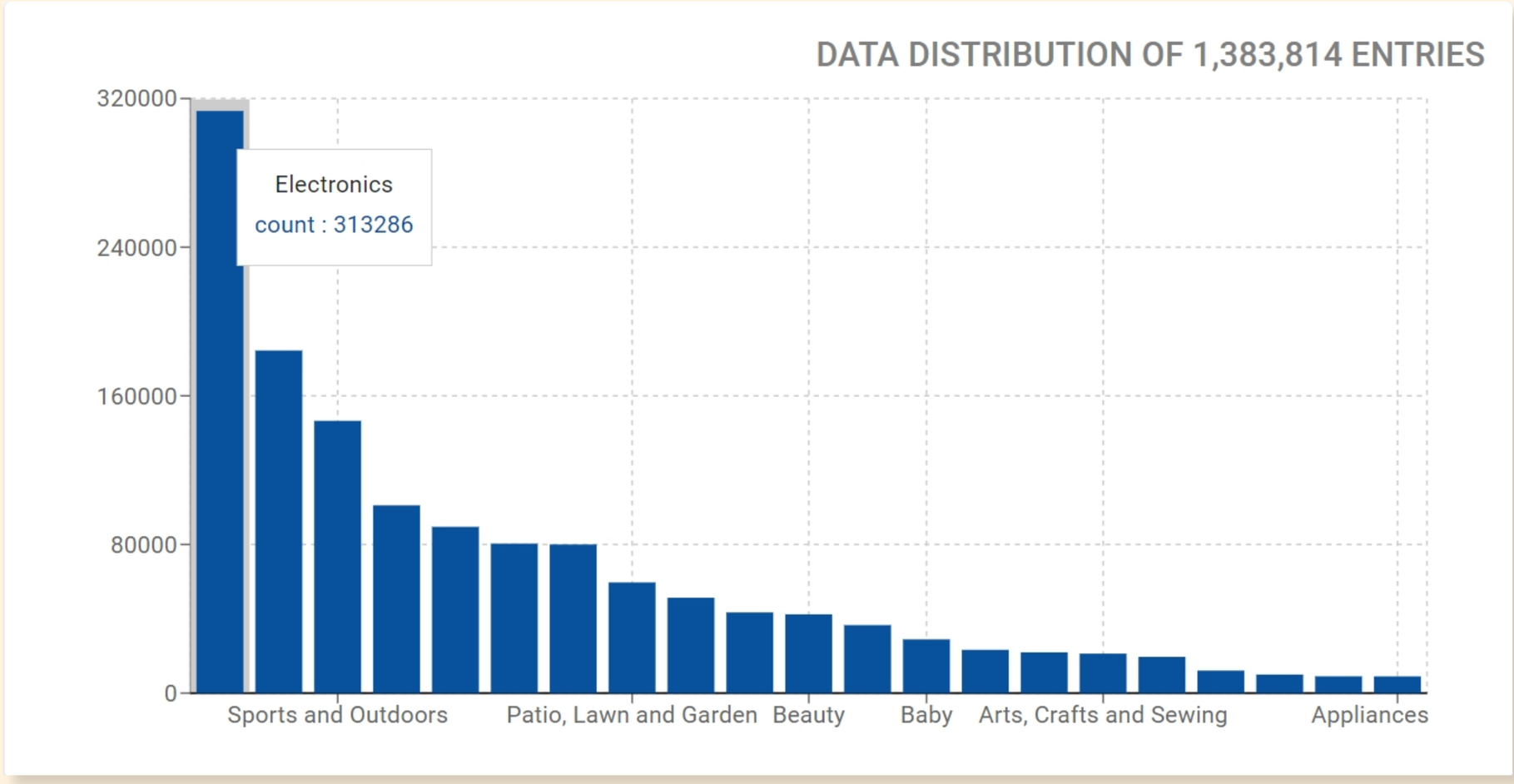
It’s an in-and-out mechanism.

Bidirectional
Encoder
Representations

Transformers

$$\text{Input} = \texttt{[CLS] the man went to [MASK] store [SEP]}$$
$$\texttt{he bought a gallon [MASK] milk [SEP]}$$
$$\text{Label} = \texttt{IsNext}$$

$$\text{Input} = \texttt{[CLS] the man [MASK] to the store [SEP]}$$
$$\texttt{penguin [MASK] are flight ##less birds [SEP]}$$
$$\text{Label} = \texttt{NotNext}$$



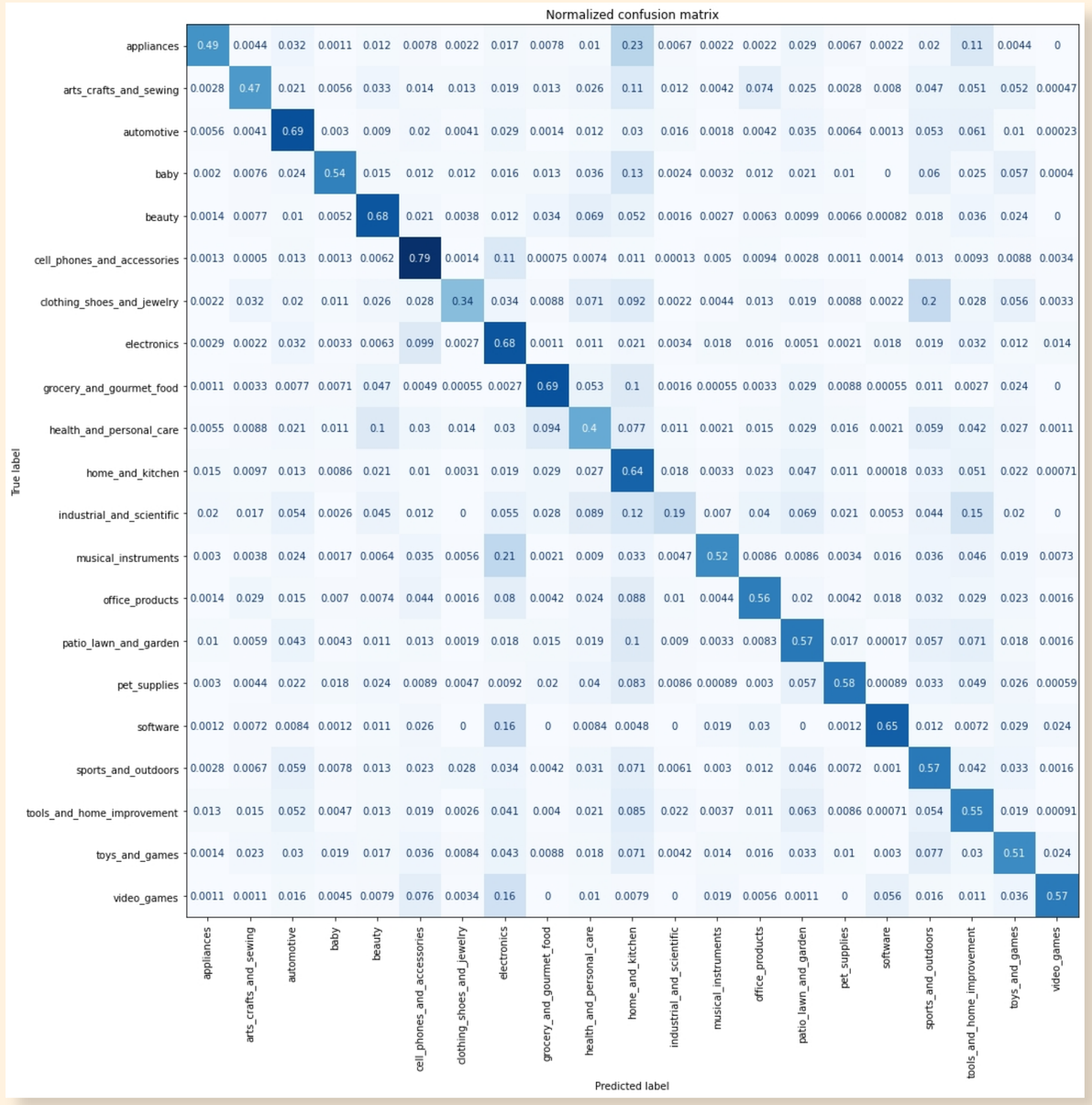
1.3m data

21 classes

180k products

Highly imbalanced

200mb model size
65% Accuracy
64% Weighted F1
.6 Cohen Kappa



Limitations

DistilBERT (smaller)

No Oversampling

No Tuning

Difficult to interpret

Slow Training

Comparisons

Smaller file size

Better Performance

More Context aware