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#STechDay**2021**

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TECH DAY_2021

The era of AI and Cognitive Services

Ticket2Vec: NLP to classify customer complaints and detect sexual harassment

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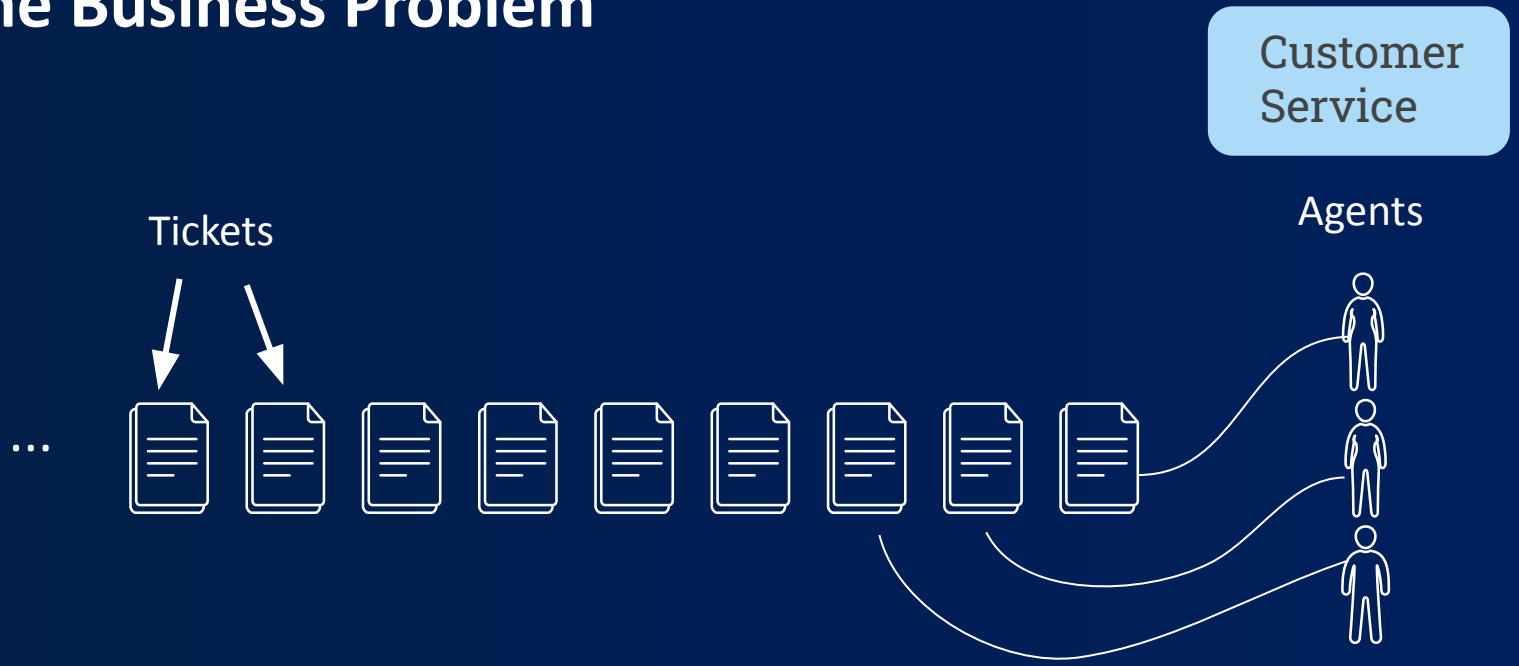
Ticket2Vec

NLP to classify customer complaints
and detect sexual harassment


Ayuda
¿Cómo podemos ayudarte?
Quiero contactar con Cabify
Selecciona el motivo de consulta
Problema con un cobro
Objeto perdido o envío no entregado
Problema con el vehículo/conductor
Tus conversaciones
Ver conversaciones
Problema con un cobro
Cancelé y me cobraron
El conductor me solicitó más dinero en efectivo
Problemas con el punto de origen o con el punto de destino
Ruta errónea
Suplementos (espera, peajes, limpieza)
Mi descuento no fue aplicado
Selecciona un viaje
mar., 26 de oct. de 2021 23:51 - 0.00 €
Inicio: Calle de Atocha, 116
Fin: Calle de Atocha, 116
Proporcionar más información
Escribe aquí si tienes algún detalle que pueda servir de ayuda
Añade imágenes o pantallazos (si es necesario)
Añadir archivo adjunto
Continuar

The Business Problem




...
Tickets
Customer Service
Lost item
Specialised agents
Classifier
Request invoice
Automatisation
All other categories
Regular agents

The Business Problem

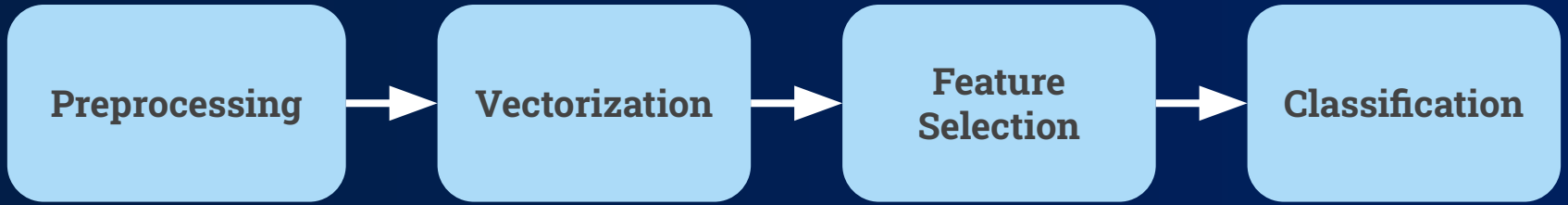
- Only information available was the option chosen by the user
- Problems:
    - Users often chose wrong label
    - Too generic options: `journey_other` `driver_other` (majority of tickets)
- Causing:
    - Operations-centered logic
    - Delays in response due to misclassifications

→ Take free text field and use NLP for better classification

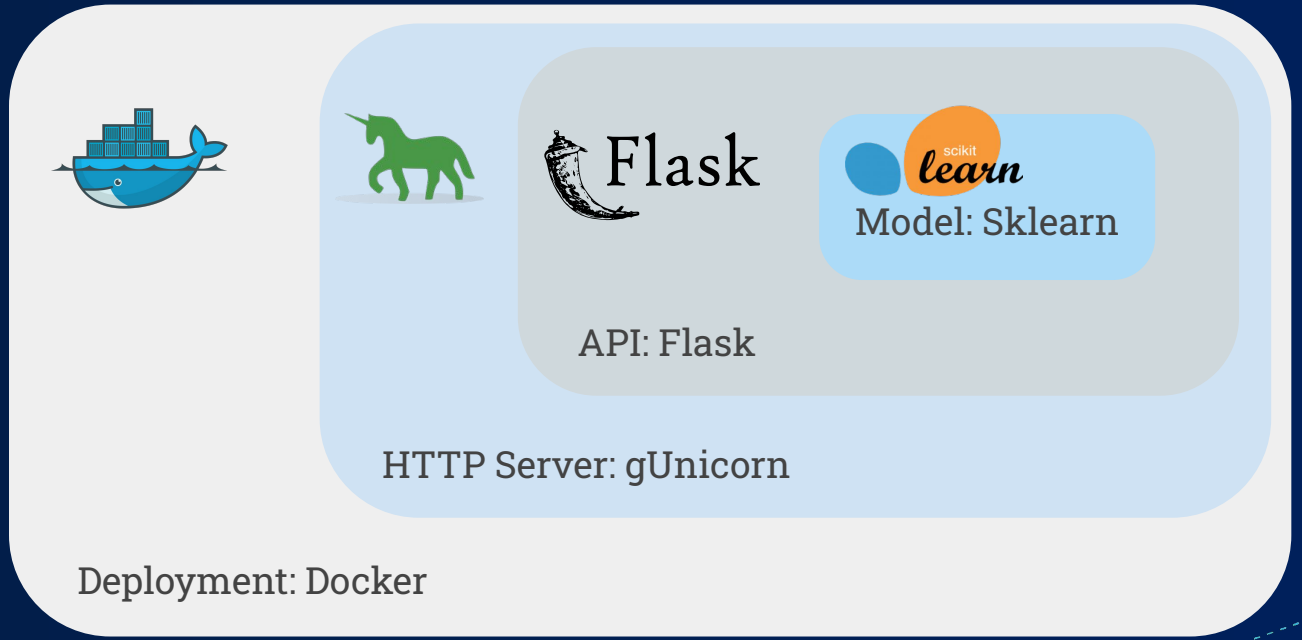
The Machine Learning Problem

- Supervised Learning
- Number of samples ~ 200.000 tickets
- Features: text
- Target: category selected by customer support team (~ 18 classes).

NLP Pipeline



Ticket2Vec in production



Detecting Harassment

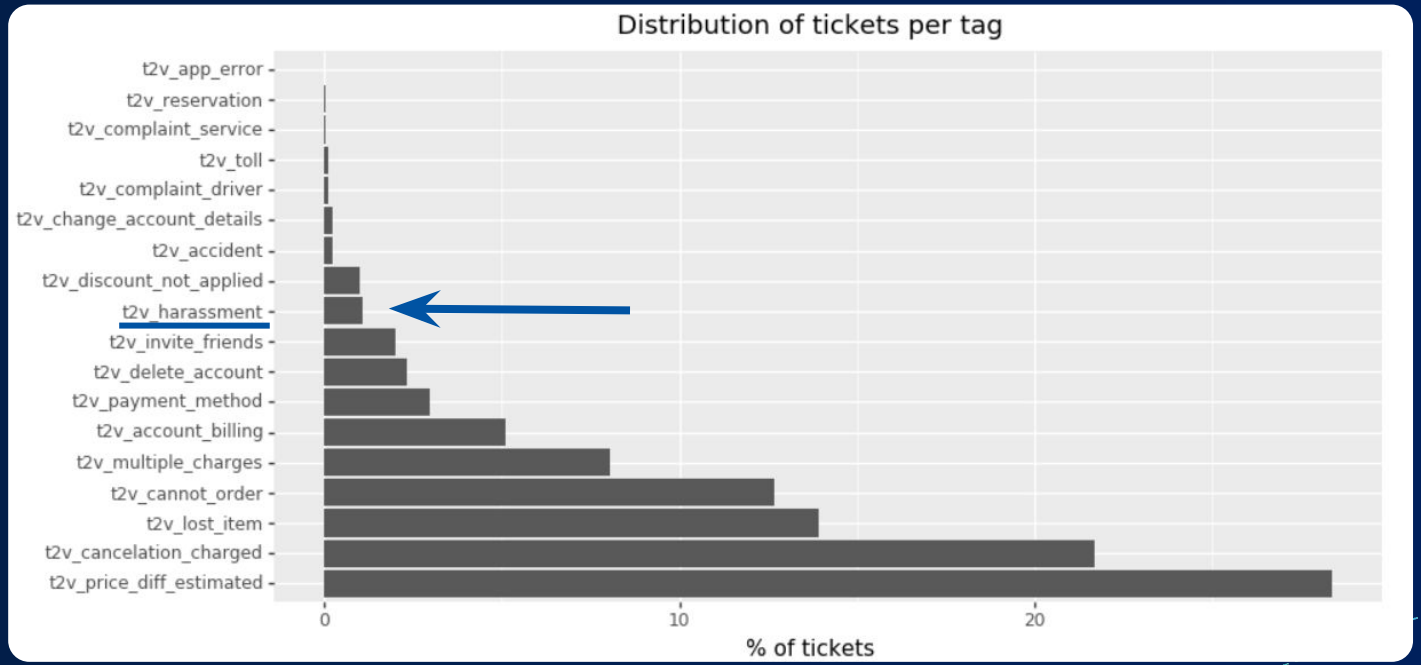
The Importance of Minor Classes

Adding Harassment Detection

- Priority queue: quicker response, trained agents, special protocols
- Why was a priority?
    - Taking care of users
    - Prevent future incidents
- Previous tool: detection with dictionary

→ If we used Ticket2Vec we were detecting zero harassment ☹

Adding Harassment Detection



Problems

- Highly imbalanced dataset
- Large number of classes
- One minority class is very important

- Classification algorithm was underperforming:
    - Out of the box classification algorithms normally do not behave well with imbalanced data
    - Most common metric for classification (accuracy) does not reflect well our goals

How we solved it

- New metrics
  - Accuracy
  - **Harassment Precision**
  - **Harassment Recall**
- Cost-based classification
  - False negative cost Cfn (not detecting harassment)
  - False positive costs Cfp (false alarm)

    In our case: Cfn >> Cfp

→ It worked! We were detecting 90% harassment tickets without sacrificing overall performance

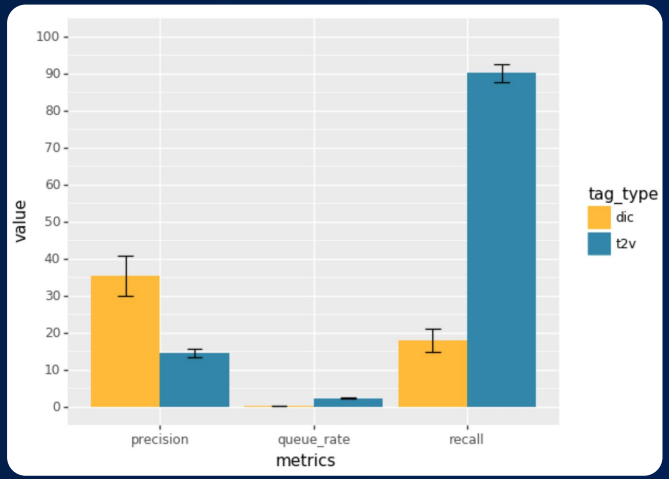
Experiment

- Validate results in real scenario
- Compare with the system to be replaced → tags selected by the users
- Experimental setting:
    - Focus on harassment and lost item categories (redirectioning to specialised queues)
    - Running for 1 month, rider tickets
    - A/B testing:
        - half of the tickets are redirected using ticket2vec tag
        - half of the tickets are redirected using the rider tag or the harassment dictionary

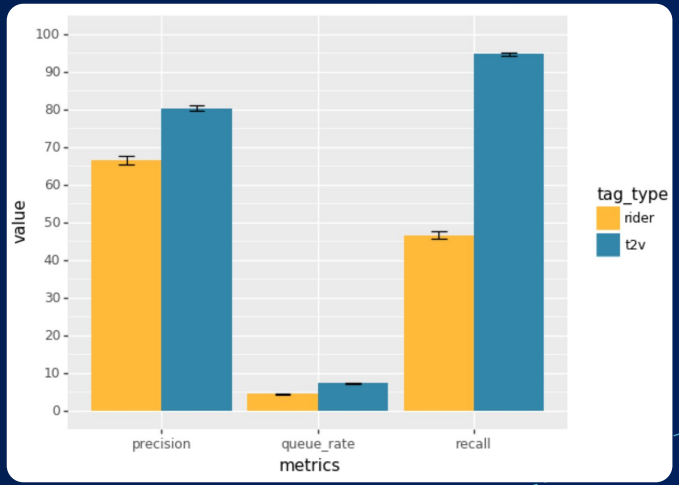
Experiment Results

- Ticket2Vec outperformed rider tags and the dictionary

Harassment



Lost item



Average resolution time

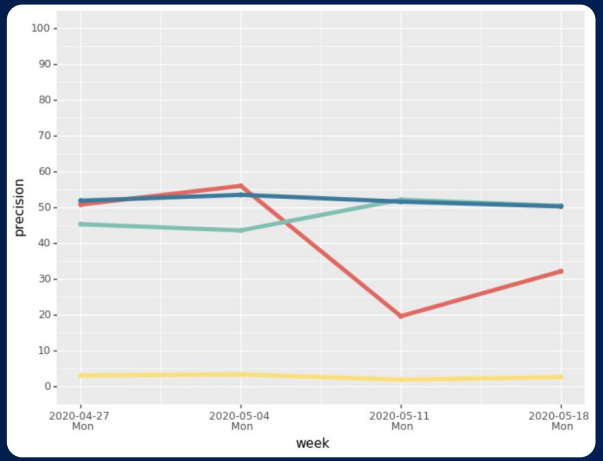
- FiRT = First Reply Time
- FuRT = Full Resolution Time

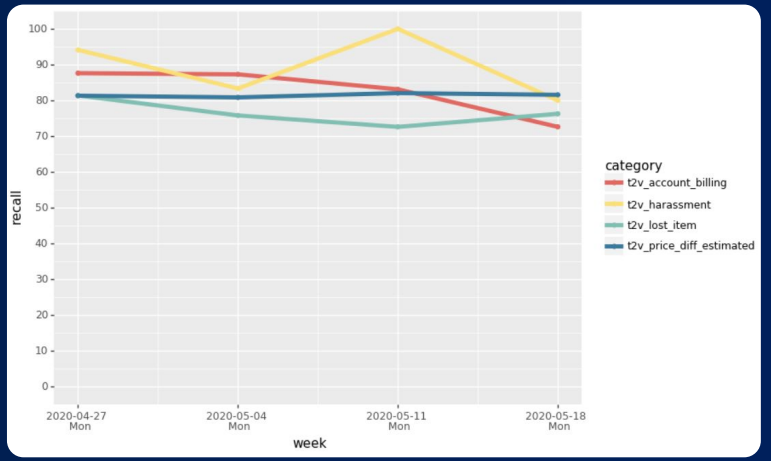
			FiRT	FuRT
ticket2vec experiment	ticket2vec experiment & tags	# Ticke..	Avg. # ..	Avg. # ..
exp0_control_group	Null	695	48.9	144.8
	exp0_control_group - harrasment	153	20.3	85.7
	exp0_control_group - Lost Item	2,832	27.7	56.2
	exp0_control_group - other	51,304	41.3	57.1
exp0_treatment_group	exp0_treatment_group - harrasment	163	10.9	68.0
	exp0_treatment_group - Lost Item	2,836	12.9	40.1
	exp0_treatment_group - other	51,379	35.1	51.3

Pilot: Solve & Redirect Tickets Automatically

- Used 4 categories:
    - Harassment (redirection)
    - Lost item (redirection)
    - Request Invoice (automatic answer)
    - Price different than estimated (automatic answer)

Monitoring performance





→ Low precision due to:

- new categories
- duplicates

Key Takeaways

- Cost-based classification can help with imbalanced problems
- Machine learning in a company is a continuous process
    - Deploy MVP and iterate
    - Experiment to prove that your model works
    - Continuous monitoring and revision

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Thank you!

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