

# Predicting women's preferences for caesarian delivery from online forum discussions

**Michele Tizzoni**

@mtizzoni

**ISI Foundation**



**AMLD**  
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# C-Section: a public health concern

- Optimising the use of caesarean section (CS) is of global concern.
- **Underuse** leads to maternal and perinatal mortality and morbidity.
- **Overuse** of CS has not shown benefits and can create harm.
- Worldwide, **the frequency of CS continues to increase**, and interventions to reduce unnecessary CSs have shown little success.
- Identifying the underlying factors for the continuing increase in CS use could improve the efficacy of interventions.

*source: Betrán, Ana Pilar, et al. "Interventions to reduce unnecessary caesarean sections in healthy women and babies." *The Lancet* 392.10155 (2018): 1358-1368.*

- Of the 6.2 million unnecessary caesareans done each year, 50% are in Brazil and China.

- Brazil also has the 10th highest number of preterm births in the world.

## C-Section in Brazil





ESPERAR PELO  
TRABALHO DE PARTO  
É IMPORTANTE PARA O BEBÊ,  
PARA A MÃE E PARA A VIDA TODA.

[quemesperaespera.org.br](http://quemesperaespera.org.br)

unicef | para cada criança  
UMA CAMPANHA PELO DIREITO DE NASCER NA HORA CERTA

# UNICEF Campaign

- April 19 - June 20, 2017
- a series of informative videos
- a dedicated website with educational materials and Frequently Asked Questions,
- Facebook posts, promoted through the UNICEF Brazil Facebook page
- printed material and advertising boards.

<https://www.unicef.org/brazil/relatorios/quem-espera-espera>

# Team

unicef  | for every child

Natalia Adler  
Paulo Henrique Alves



Alberto Ceria  
André Panisson  
Daniela Paolotti  
Kyriaki Kalimeri

# The Dataset



- BabyCenter is a popular website in Brazil that provides information on **conception, pregnancy and maternity** in general
- The app version of the platform has been downloaded by more than **500,000 users**
- The dataset consisted of comments related to threads which contain the words **“C-Section”** or **“childbirth”**

Thread Name



TENTANTES GRAVIDEZ BEBÊ CRIANÇA SUA VIDA ENXOVAL, QUARTO & FESTAS NOMES COMUNIDADE



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## Cesárea



**Lehhsimplicio**

19/07/17

Thread Creator

Meninas vocês que vão fazer cesárea, quanto custou ?

♥ 0



Compartilhar



Thread Content

## (5) comentários

[Comentar este tópico](#)



**LulukaRS**

19/07/17

Comment Creator

No meu caso vou fazer pelo plano! Não vai custar nada,... acho q tem um tópico mais antigo sobre preço das cesarianas,... de repente da uma procurada nos tópicos anteriores,... talvez ajude!

Responder

♥ 1



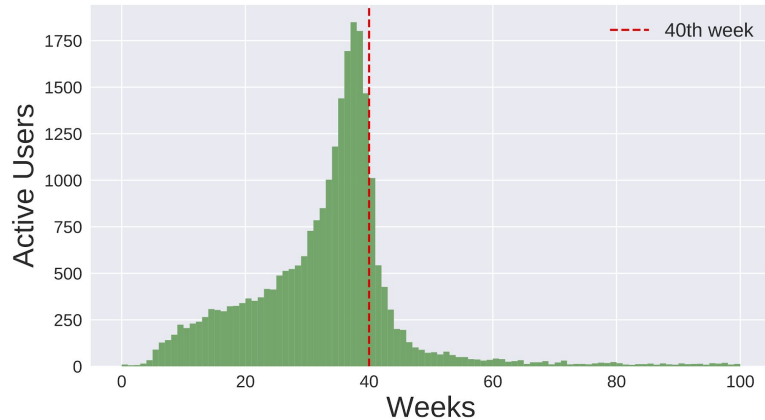
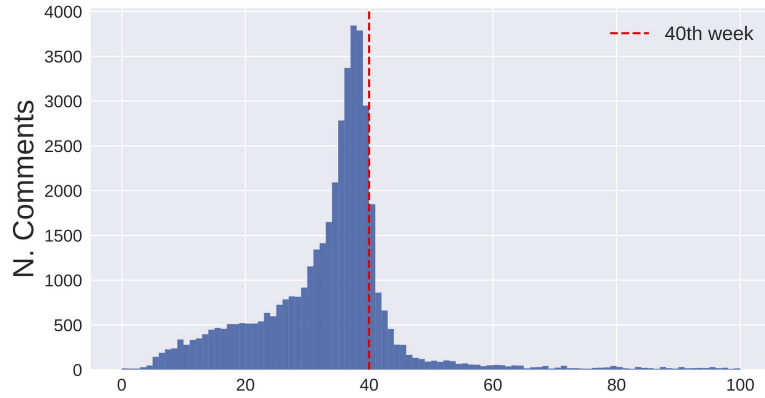
Comment Content

# Objectives

- Analysis of the overall volume and the temporal evolution of term frequencies in posts published along the gestation period.
- Differences in the evolution of term frequencies between C-Section and natural childbirth users.
- Measure differences in term frequencies to identify the moment in which the delivery choice is taken.
- Predict choice of delivery based on term frequencies.



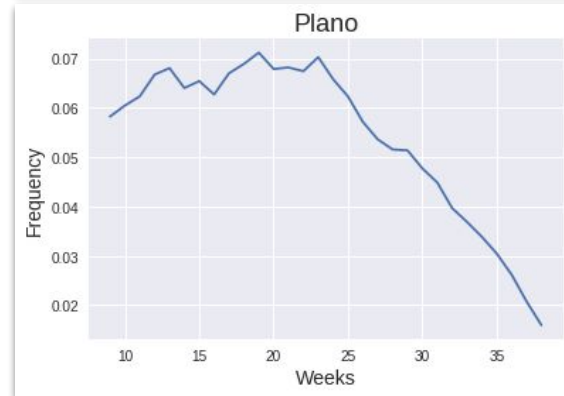
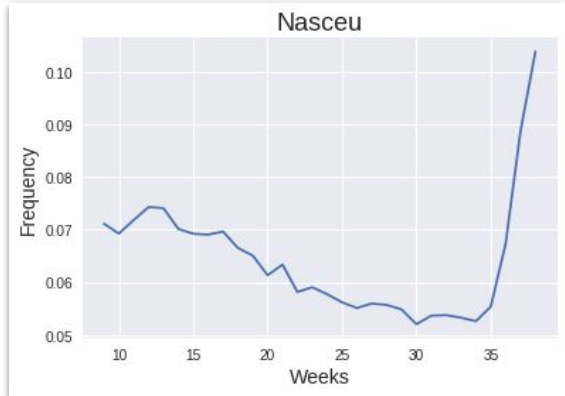
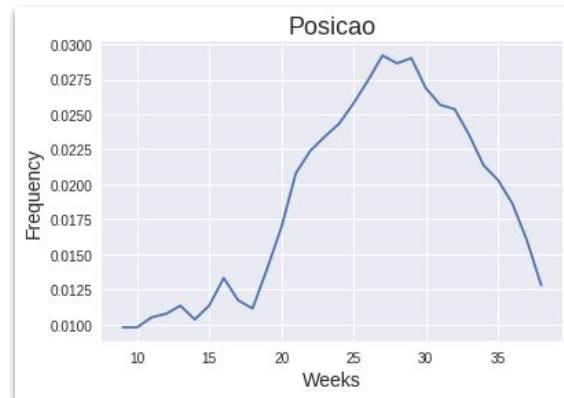
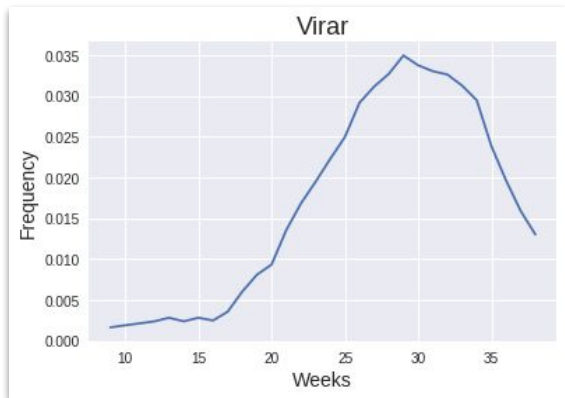
# Activity along the gestation period



We detect the state of pregnancy for 8,410 users through regular expressions.

Users' activity is **not uniform** along the gestation period but increases significantly as the due date approaches.

# Terms frequency



# Dynamic Time Warping

Blue

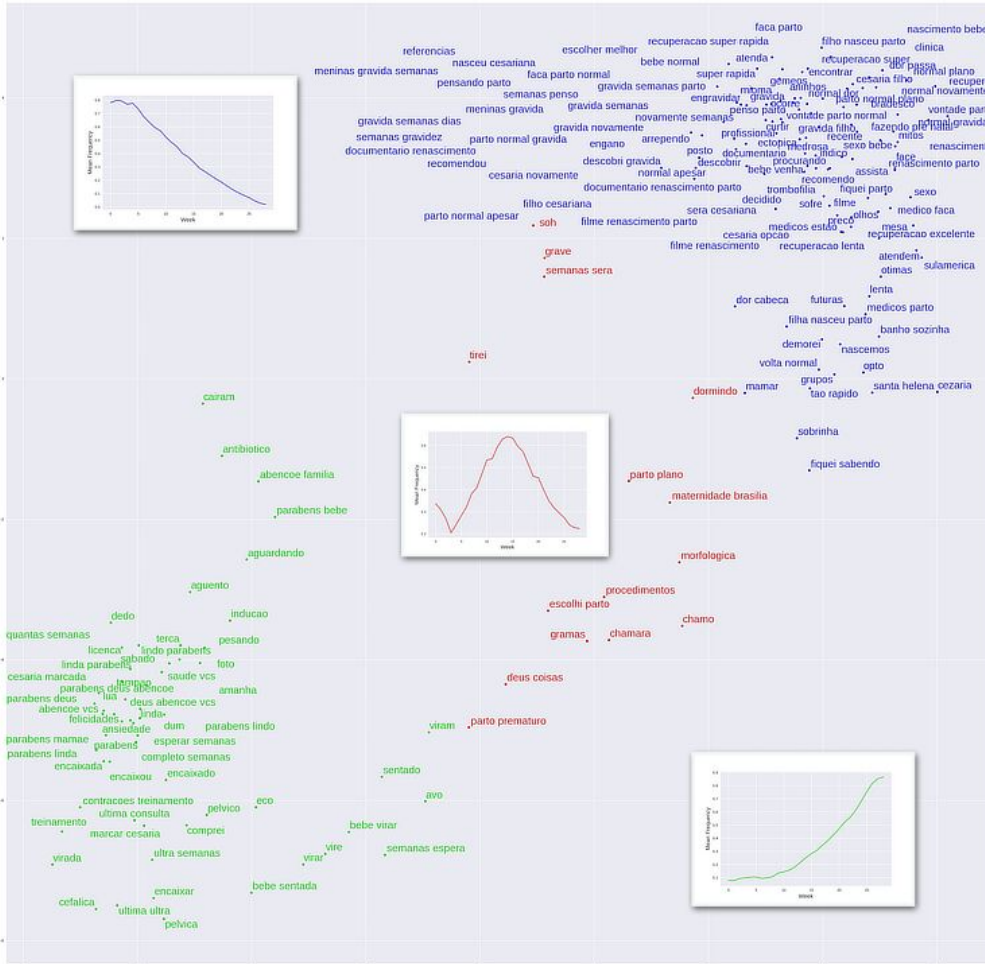
nurse, I heard, childbirth, pregnant girl, headache

Red

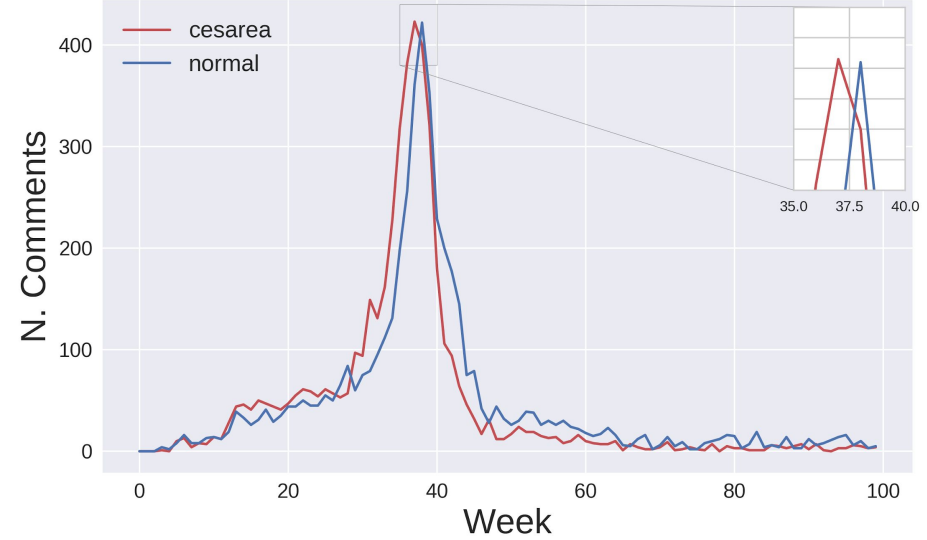
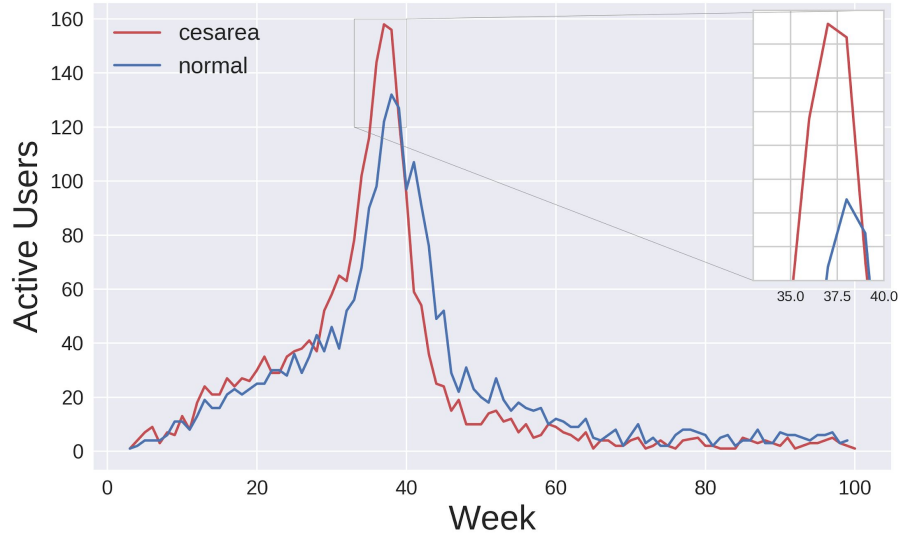
delivery plan, choice of delivery, morphological

Green

weeks wait, baby turn, ecosound



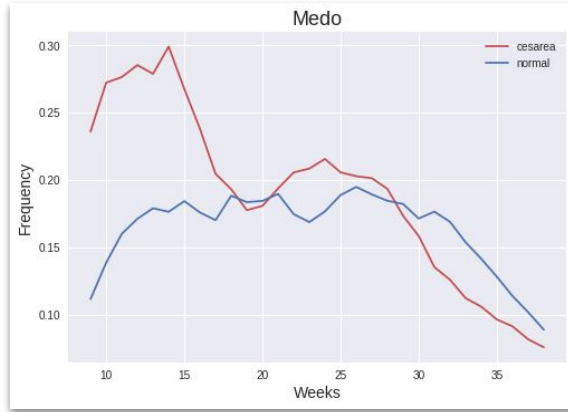
# Disaggregated Analysis



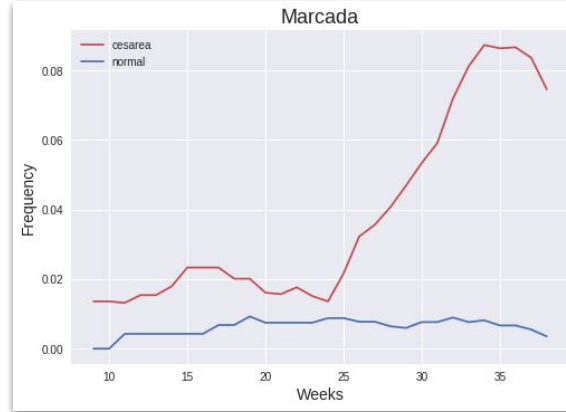
We identify through regular expressions the delivery choice for 619 users:

- **55%** C-Sections
- **45%** natural delivery

# Disaggregated Terms Frequency



**Fear**



**Booked**



**Wanted**

**normal**

# Classification

We build a Naive Bayes text classifier to predict a user delivery choice. The training set is defined by a window  $[Start\_week, End\_week]$ .

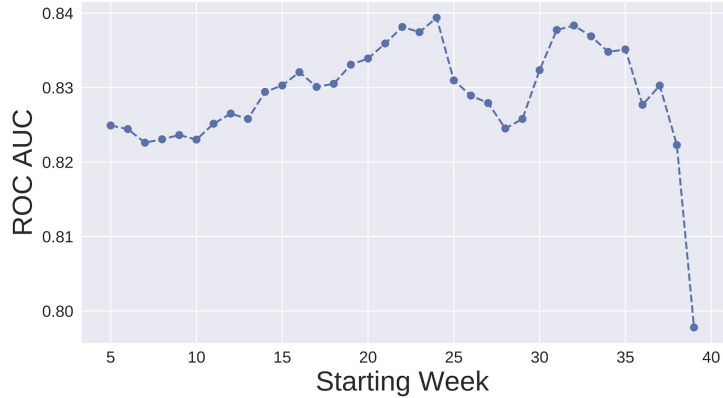
## Experiment 1

The training set has a fixed  $End\_week=40$  and the performance (ROC AUC) of the classifier is evaluated by changing the  $Start\_week > 5$ .

## Experiment 2

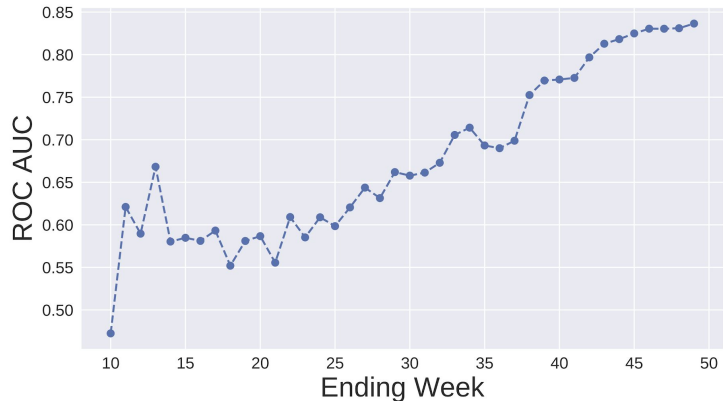
The training set has a fixed  $Start\_week=5$  and the performance (ROC AUC) of the classifier is evaluated by changing the  $End\_week > 5$ .

# Classification



## Experiment 1

The training set has a fixed *End\_week*=40 and the performance of the classifier is evaluated by changing the *Start\_week*>5.



## Experiment 2

The training set has a fixed *Start\_week*=5 and the performance of the classifier is evaluated by changing the *End\_week*>5.

# Conclusions

- Internet forums are highly informative to understand attitudes and behaviors related to maternity and parenting.
- Standard NLP techniques are useful to identify topics pertaining to delivery choices.
- A user's delivery preference can be identified from textual content.
- Results could be used to promote awareness campaigns.



*Thank you!*



*Questions?*

**Michele Tizzoni**  
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