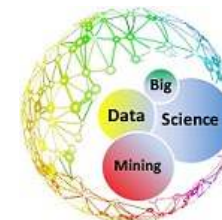


16/11/2018



# Recherche d'informations sur l'Autisme à partir de forums de discussion sur le web

Romain GUILLIER  
Data Science Project Manager  
Servier

# Romain Guillier

- Formation de statisticien « généraliste »
- 10 ans d'expérience en SSII
- 7 ans dans l'industrie pharmaceutique
  - Chargé d'étude « Data Mining »
  - Chef de projet « Data Science »



## LINCOLN





# Goal



16/11/2018

3

- Question : Our clinicians is looking for tips and tricks to deal with blood tests in CT for children with autism
- Patients and parents opinion VS clinicians opinion
- First idea : survey on about 30 families
- Data Science Team proposal : get information on the web from discussion forums

# Team Project

- 2 Clinicians
- 1 Biostatistician
- 1 Data Science Project Manager
  
- With the support of our partner EULIDIA for Web Scraping and Text-Mining analysis parts

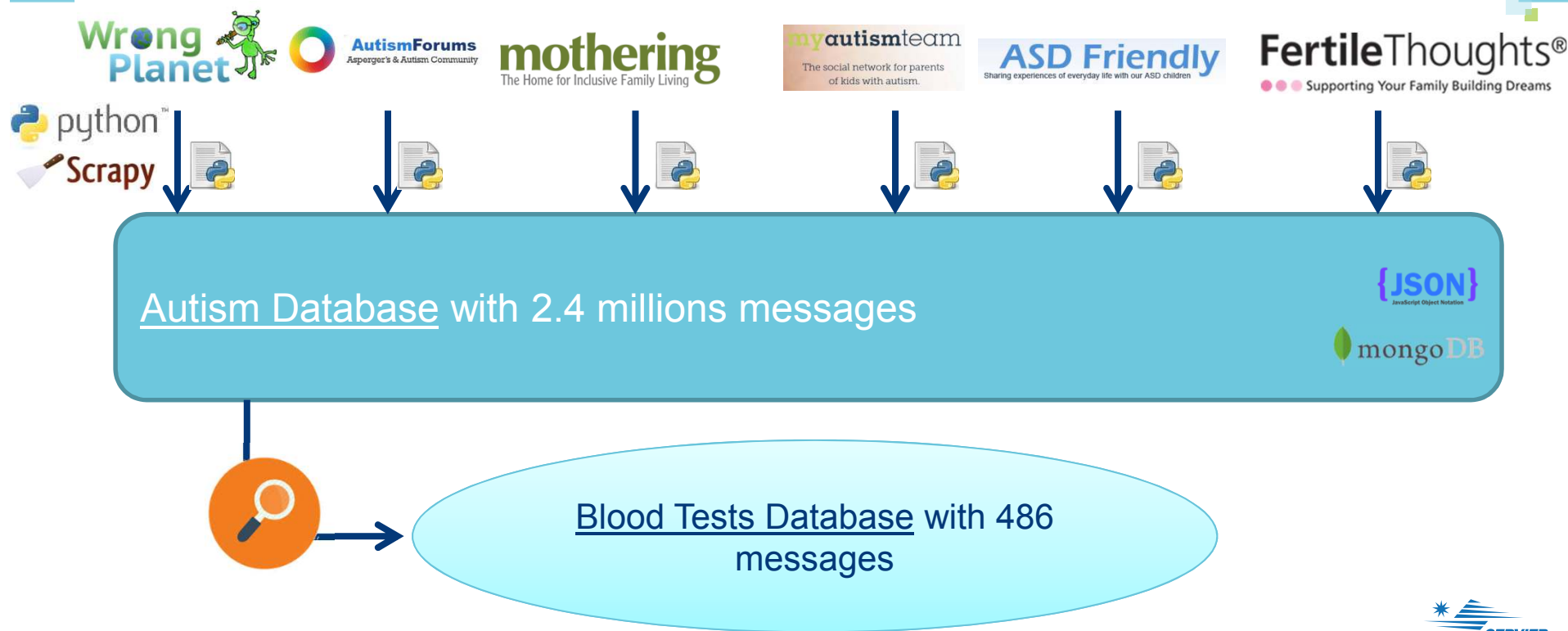


eulidia  
BUSINESS PERFORMANCE PARTNER





# Forums identification & Web Scraping



## Autism Database : some statistics

- Number of forums : 6
- Number of topics : 141 808
- Number of messages : 2 403 163
- Average number of messages by topic : 16,9
- Number of visited URLs : 253 192

# Creation of the Blood Tests Database

Collaborative work with clinicians on keywords' definition in order to create the Blood Tests Database

Mots clés dans le topic\_name:

Mots-clés	Nb messages	Commentaire
blood	1138	corpus trop large
blood test, blood taken, donating blood, blood work	240	corpus acceptable
blood + [sentiments]	62	inclus dans catégorie précédente
blood test, blood taken + [sentiments]	34	corpus pertinent
syringe	6	corpus pas pertinent
syringe + [sentiments]	0	corpus pas pertinent
needle	127	pas complètement pertinent
needle + [sentiments]	5	corpus pertinent
sedation	47	corpus pas pertinent
sleeping gas	0	corpus inexistant

Mots clés dans le message:

Mots-clés	Nb messages	Commentaire	Messages pertinents / 25 messages
blood	18854	corpus trop large	1
blood test, blood taken, donating blood, blood work	4746	corpus trop large	3 (1 child reaction)
blood + [sentiments]	9051	corpus trop large	1
blood test, blood taken + [sentiments]	1363	pas complètement pertinent	4 (2 child reaction)
syringe	152	corpus pas pertinent	1
syringe + [sentiments]	86	corpus pas pertinent	2
needle	444	corpus pas pertinent	2
needle + [sentiments]	247	pas complètement pertinent	8 (all medical phobias)
sedation	47	corpus pas pertinent	0
sleeping gas	0	corpus inexistant	0
sedation + blood	31	corpus pertinent	2
(blood test, blood taken + [sentiments]) - [false positive messages]	171	corpus pertinent	22



## Blood Tests Database : some statistics

- 486 Messages
- 6 Forums
- 200 Topics
- 340 Unique users

Are you scared of needles in general like having blood drawn or getting shots?

Susan, try using social stories and role play with him. You can even try getting some dummy needles and play doctor and patient with him taking turns. Let me know how that works.

Last time was years ago, and 2 nurses and I had to hold him down while he kicked and screamed... Bribes don't work, threatening, begging, etc lol. We even tried sedation (Ativan) with disastrous results. :(

@Eddie, thanks so much!!! Excuse my ignorance but what is Versed? Is it a sedative? And hopefully it is given orally by mouth. I put a call into my local hospital today to see about a patient advocacy dept [...]

My son has severe needle phobia. The nurse distracted him and while he was talking about his newest video game, another nurse took his blood and he barely flinched [...] Distract him with a favorite toy, book or story or if he is verbal [...] Hope it helps!

[...] we were able to distract our son with his favorite YouTube videos on the iphone and he stopped resisting and could do the blood draw while being restrained [...]

The EMLA worked great for our blood draw. He still was scared of being restrained, but when he realized it didn't hurt he was much less distressed! [...]

# Preprocessing

- Tokenisation = identifying the words
  - “*he didn't arrive*” → **tokenisation** → “*He*” “*did*” “*n't*” “*arrive*”
- Stopwords analysis = removing words without meaning :
  - a / the / it / me / I / do / be /
- Lemmatisation :
  - “*sampling*” → “*sample*”
  - “*theoretically*” → “*theory*”
  - “*better*” → “*good*”
  - “*fisher*” → “*fish*”

My ds needed to be held down by 4 nurses...  
then eventually he started asking questions and  
they listened and it slowly got better. We also  
get a McD's orange juice after blood draws... that  
worked the best.



need hold nurse start ask question listen slow got  
better orange juice blood draw work best

# Natural Language Processing and Understanding

- N-grams Analysis :  
frequency and correlations

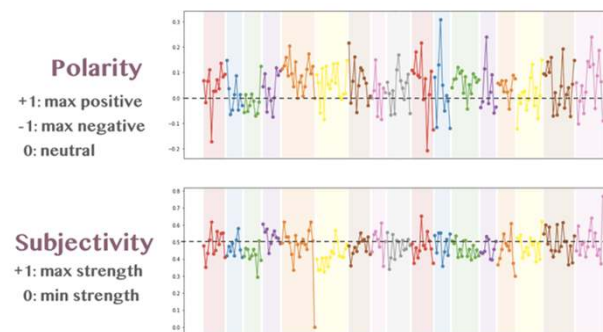
- Sentiment Analysis :

Natural Language  
Tool Kit (NLTK)  
Basic Text Analytics



*le chat mange la souris*

- bigrammes (n-grammes de longueur 2)  
*(le chat) (chat mange) (mange la) (la souris)*
- trigrammes (n-grammes de longueur 3)  
*(le chat mange) (chat mange la) (mange la souris)*



Polarity & subjectivity – Harry Potter Book 1

- Theses methods will be combined to analyse and find insights

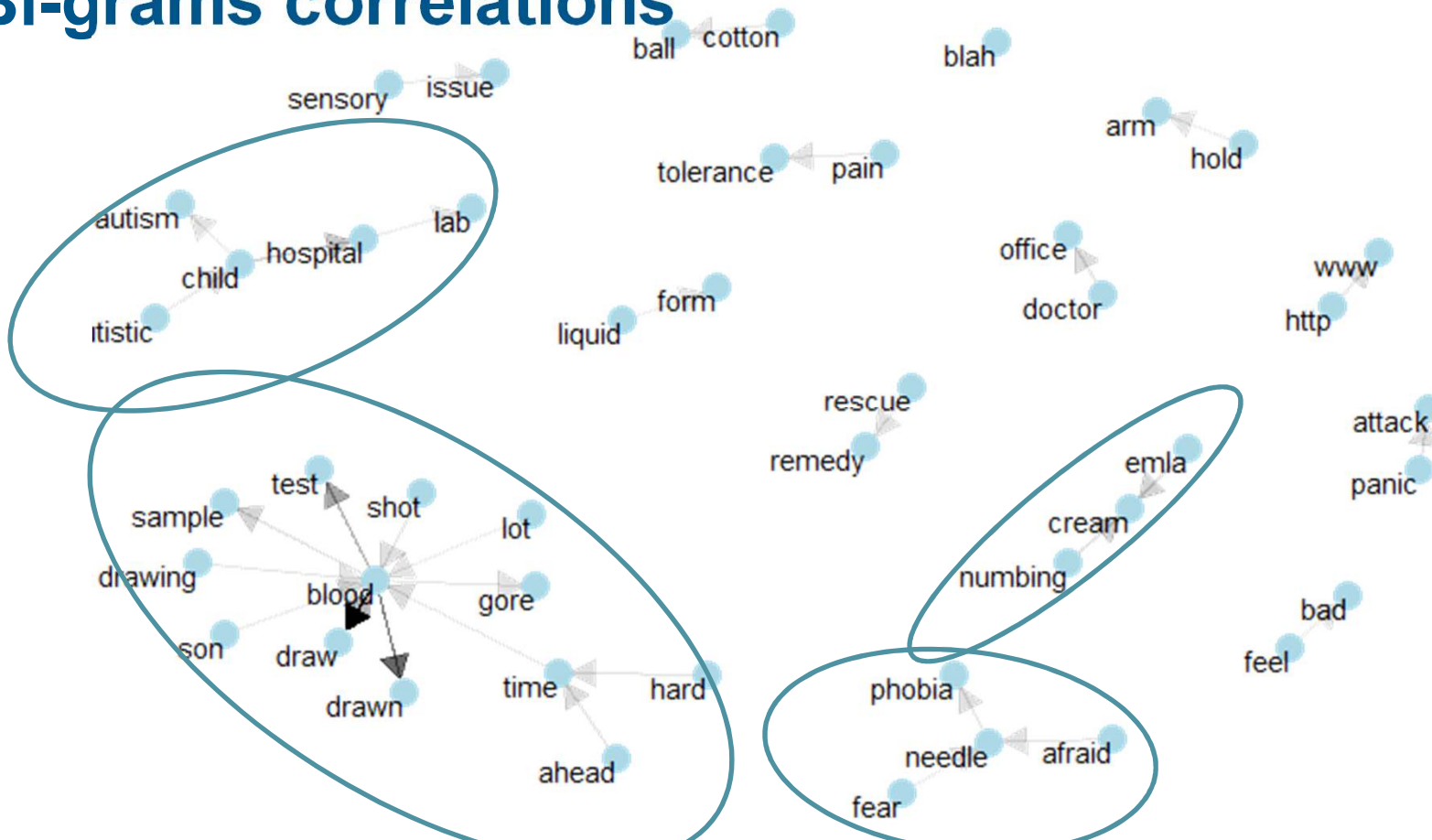
## N-grams frequencies

Mot	Fréquence
get	326
time	286
one	228
child	202
needle	161
son	157
make	149
need	138
going	137
people	130

Bigram	Fréquence
year, old	30
child, hospital	27
make, sure	21
numbing, cream	20
good, luck	19
emla, cream	18
last, time	16
first, time	16
get, done	14
anyone, else	13

Trigram	Fréquence
high, pain, tolerance	3
every, time, get	3
year, old, son	3
take, deep, breath	3
help, hold, arm	3
rescue, remedy, help	3
child, hospital, lab	3
needle, foot, hand	3
different, perception, pain	2
low, pain, tolerance	2

# Bi-grams correlations



# Sentiment analysis (1)

## Positifs

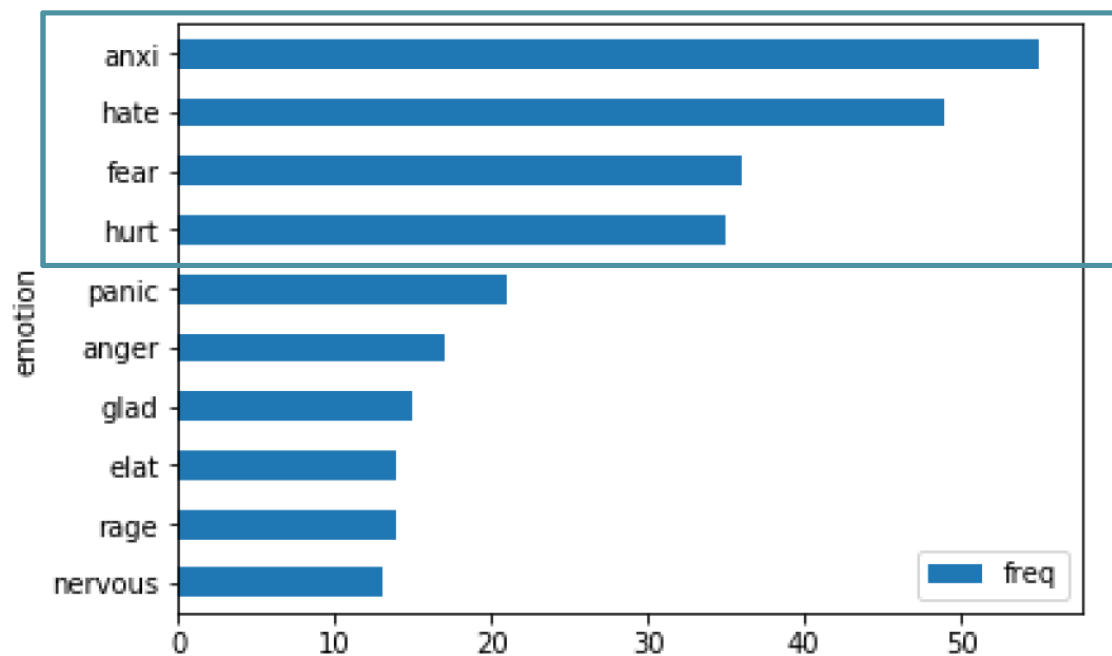
- “The last blood draw Andrew did they **put EMLA** on about 30 min. to an hour before and I thought it helped. The stuff is tricky as you have to cover it. You don't want it in their mouth or eyes or anything and you have to clean it afterward but it did help him. **Best blood draw we've ever had.** It also helped **that we had the top person there** -she was good.”
- “Well, we got **new good techs** this time, they did his hand, and it **went great.** I held him in my lap - mostly standing up, cause he wanted to! - and his dad has one of his arms, the tech and I had the other, and he didn't cry except when they pulled the needle out. He was a little fussy because he couldn't grab the syringe with his blood in it (it just looks so interesting!), **but other than that, did just fine . Yay!**”
- “Get **EMLA cream, use calming homeopathic or Rescue Remedy,** try to tell your son what will happen before you go...maybe with **pictures** if the language isn't there to explain. **Offer a reward** to get his mind off it immediately afterward, like a special treat. And good luck.”
- “I took my son to Boston Children Hospital today to have blood drawn. He was given **Versed 20mg. It worked!** He was complacent. First time in a year.. No operating room. He was in a regular room. **I was so happy...** Now he's going around showing everybody his band aid and how he had his blood drawn.”

## Négatifs

- “ My ds has a very high pain tolerance for most things (he can bang his head on the wall for ever, hurt himself etc. and not cry) but the **exception is blood draws** and ivs, it makes him **very agitated and paranoid.** He often gets **delusional,** that they are going to kill him or take all his blood ”
- “... He's **obviously struggling** though, but this blood draw **has him worried.** he told me tonight that **he's scared of it.**”
- “Last time I was at the doctor I **hid under a sink and refused to come out.** The time before that I had to **get my blood drawn** and I **screamed and cried and tried to run away.** It took 3 nurses and my mom to **hold me down.** I don't want to be sent to the nut house for it when I'm an adult. **I have no control over it,** its like when I get there I totally loose my mind.”
- “A lot of people are scared of needles. My Ds **passes out whenever he sees one** and my dd **used to be terrified of them** and she's diabetic! She had to **go for hypnotherapy** to cure his **fear of needles,** because if he didn't inject his insulin he could have died “
- “My son has to have **blood work done and I have tried everything including bribery** to get him there. But this time **he has his heels dug in and will not budge.**”

## Sentiment analysis (2)

- Emotions most present in the Blood Tests Database



# Insights

- Using numbing / anesthetic cream

... Also find out about EMLA cream. It is a lidocaine cream that numbs the skin to a pretty decent thickness... **makes blood draws a lot easier.** I honestly don't know why they don't tell new parents about EMLA cream--we'll be using it for any kind of needles in the future. Good Luck!!!

This- the EMLA makes all the difference for my little guy. He is still fearful and needs to be restrained sometimes ...

- Using a butterfly needle

Great advice above. I would add to request a special blood draw appointment where your child has a private room and can lie down in comfort. Distraction works great, so talk and show electronic games or something interesting during the blood draw. **Ask for a butterfly needle, which they should always use for a child.**



## Insights (2)

- Inform the patient

**We've used visuals to help our son understand what to expect.** I make sure to bring his favourite toys and books to distract him. You may also want to find videos on YouTube that will show him what will happen at the dentist or hospital. [...] Here are a couple of guides with tips about going to the dentist and having blood drawn.....

Our pediatrician prescribed lidocaine cream. **That and an IPAD did the trick.** Lab people tried their best **with showing him what the tools were**, but too much information can add to the drama. Distraction, Lidocaine cream, and lots of attention on him rather than the procedure did the trick.

- Holding arm

**Holding arm** still as possible helps of course! I thought it would go much worse than that, so I was relieved. There were 2 workers there, one drawing the blood and one assistant to help with holding his arm.

... Try to sit in the chair with your child on your lap rather than lying the child down on a table. If you are asked to hold your child's arm while the phlebotomist does the stick, **HOLD THE ARM FIRMLY**. You are doing your child no favors by letting them pull away from the needle, even though it may feel like you are an accomplice to the trauma ...

# Conclusions

1. Unexpected and useful insights for the coming up CT
2. The database of 2.4 millions messages can be updated and/or used for others questions on autism
3. Social Networks and Text Mining analysis are useful in order to :
  - better understand and listen to the patient
  - Help drug developpment

Thanks for your attention !



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