Exercise 4

Database Design/Implementation

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INTRODUCTION TO DATA SCIENCE AND DATA VISUALIZATION

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PROFESSOR

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Exercise 4:

Database Design/Implementation

PROBLEM DOMAIN

Our problem can be seen as a natural language issue, we want to be able to teach what humor is and what is not to a machine. For this purpose we have a particular dataset, so the focus would be on preprocessing/transforming the data extracting the information that is required to infer the characteristic of interest in the phrase. Accordingly, activities such as seeking other databases, joining or filter are not applicable. Nevertheless, in order to demonstrate that our model is able to generalize, some train/test splits will be performed in the data such as many other machine learning applications that can be found in the literature.

DATA DESCRIPTION

Our principal dataset for this work is the same that is proposed in the aforementioned case of Study paper and it is available on: https://www.kaggle.com/datasets/deepcontractor/200k-short-texts-for-humor-detection. It is a single file called ”dataset.csv” of about 15MB, it has two columns: ”text” and ”humor”. The former one is where the phrases potentially containing humor are, so its type is ”string”, on the contrary the latter is a boolean Column (where the possible values are ”True” or ”False”), indicating for each row if the sentence present in the text variable is humorous. In total there are 200.000 rows without repeated values. A major detail is that exactly 50% of the entries have True and the other half have False, so it is a balanced situation.

RELATIONAL DATABASE MODEL

The data has been modeled using a Relational Database Model as is shown in Fig. 1. As already mentioned in the description of the data, the main dataset is a file with two columns: *Text* and *Mood*, which were proposed as the "*Phrase*" entity with *Phrase* and *Label* attributes respectively. Other entities such as Repository, Source and File are proposed to store metadata.

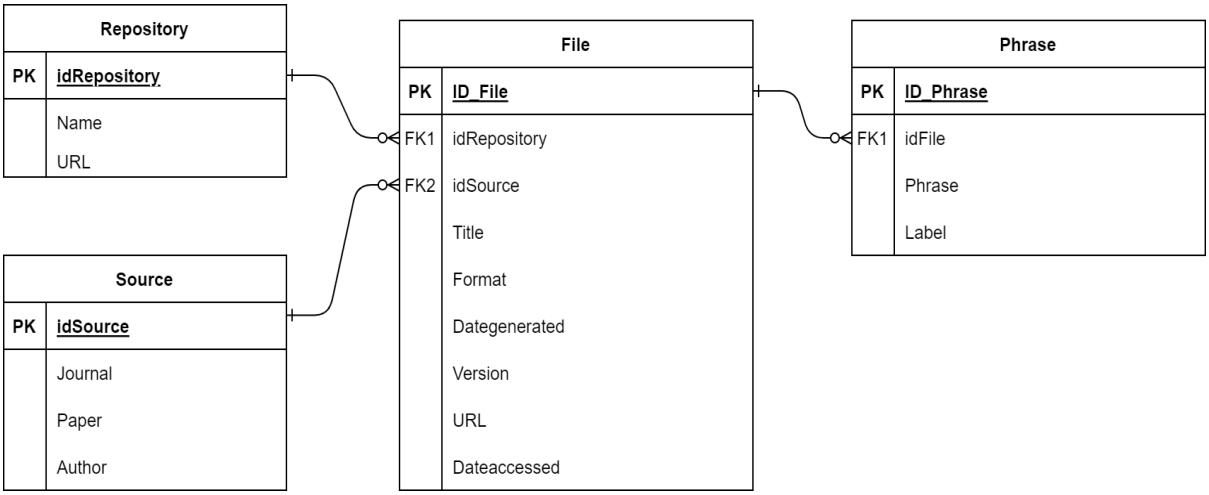


Fig. 1 SQL model

NOSQL MODEL

Similar to the SQL model it was proposed with similar collections as is shown in Fig. 2.

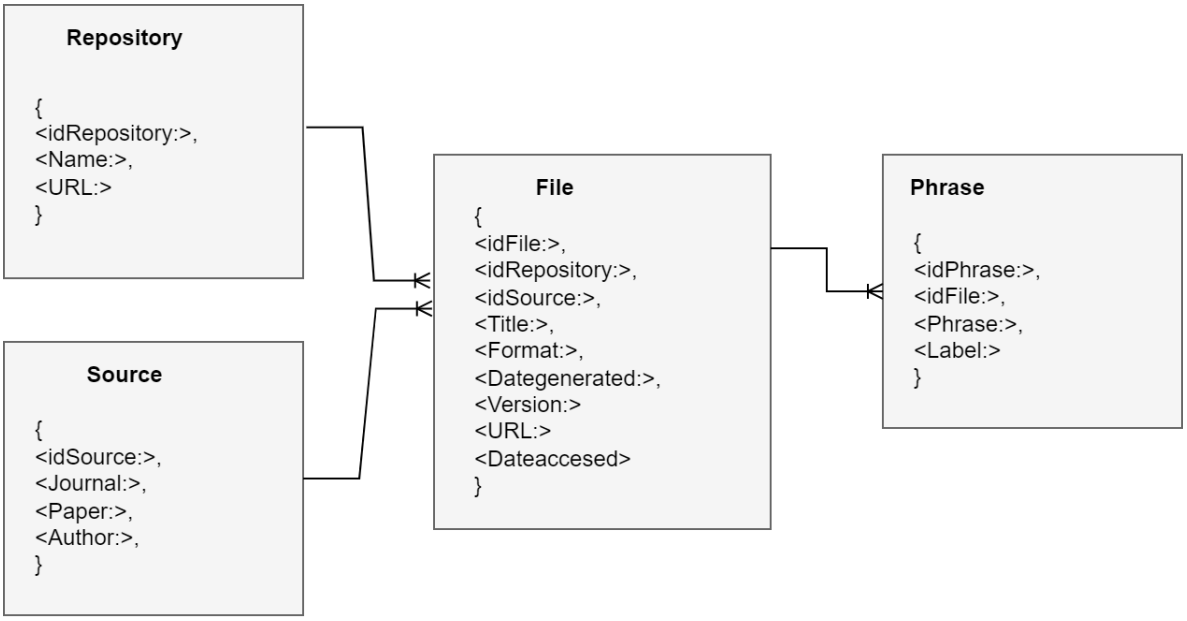


Fig. 2 NoSQL model

This model store the information using collections in specific structure as is shown in Fig.3

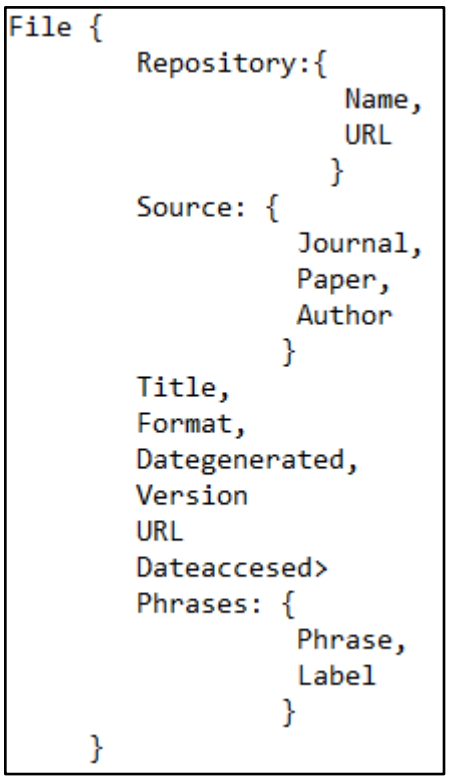


Fig. 3 NoSQL structure

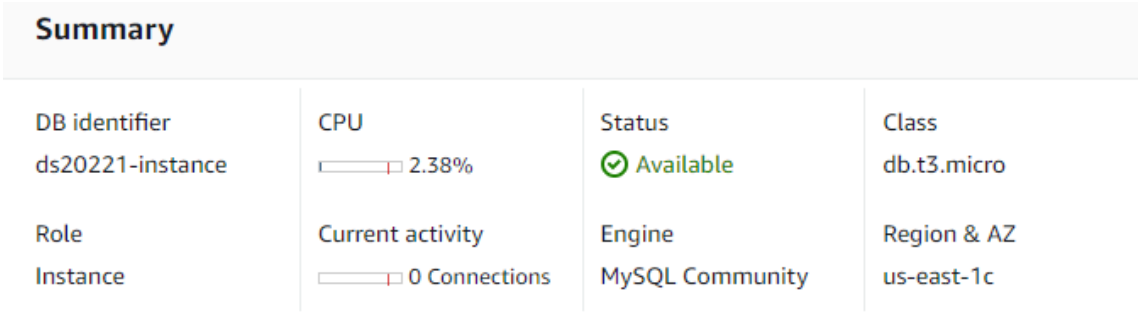
RELATIONAL DATABASE IMPLEMENTATION:

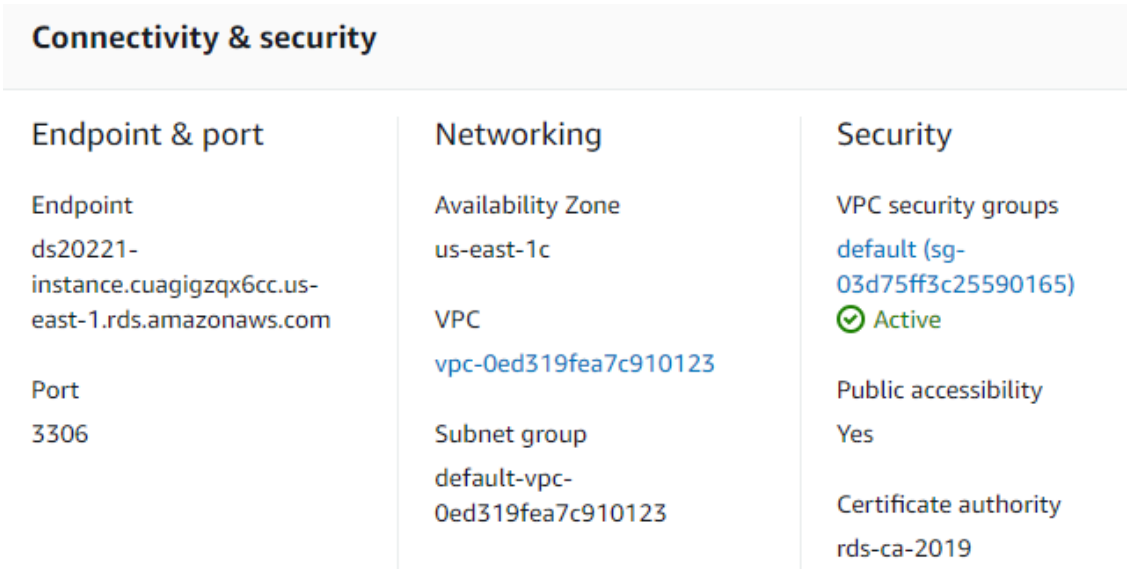
The deployment was done in AWS using the RDS service. It was created on MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation.

The SQL part of “MySQL” stands for “Structured Query Language”. SQL is the most common standardized language used to access databases. Depending on your programming environment, you might enter SQL directly, embed SQL statements into code written in another language, or use a language-specific API that hides the SQL syntax.

The deployment has the following features:



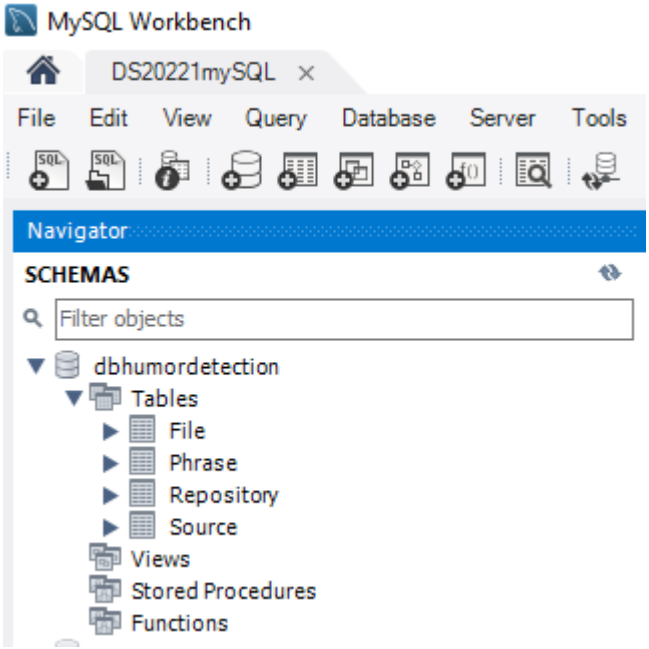


In order to create the database and tables according to the model, it was necessary to install mySQL Workbench.

Secondly, It was prepared a connection to the instance using the connection parameters:

Hostname:	ds20221-instance.cuagigzqx6cc.us-east-1.rds.amazonaws.com
Port_	3306
user:	admin
password	**********

After that, the database schema “dbhumordetection” was created and the tables according with the proposed model Repository, Source, File, Phrase:



Finally the process of populating the database was established and on each table as is shown by the following printscreens:

Table Repository

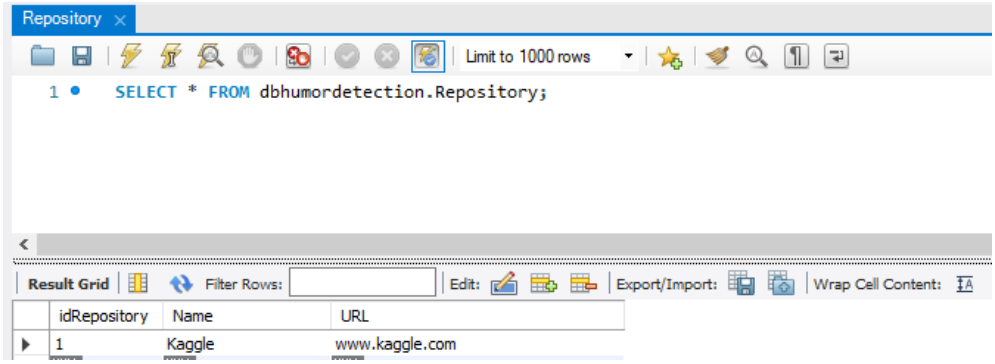


Table Source:

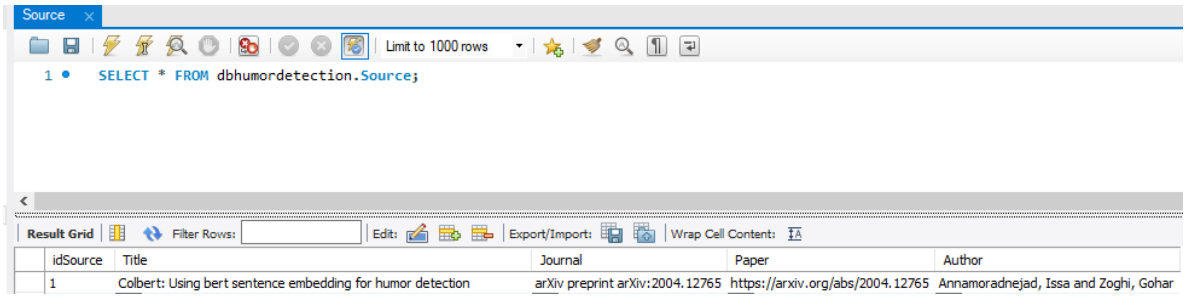


Table File:

File

```
SELECT * FROM dbhumordetection.File;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

idFile	idRepository	idSource	Title	Format	Dategenerated	Version	URL	Dateaccessed
1	1	1	Colbert: Using bert sentence embedding for hu	csv	2021-01-22	1	https://www.kaggle.com/datasets/deepcontrac...	2022-05-13

Table Phrase:

Phrase

```
SELECT * FROM dbhumordetection.Phrase;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell C

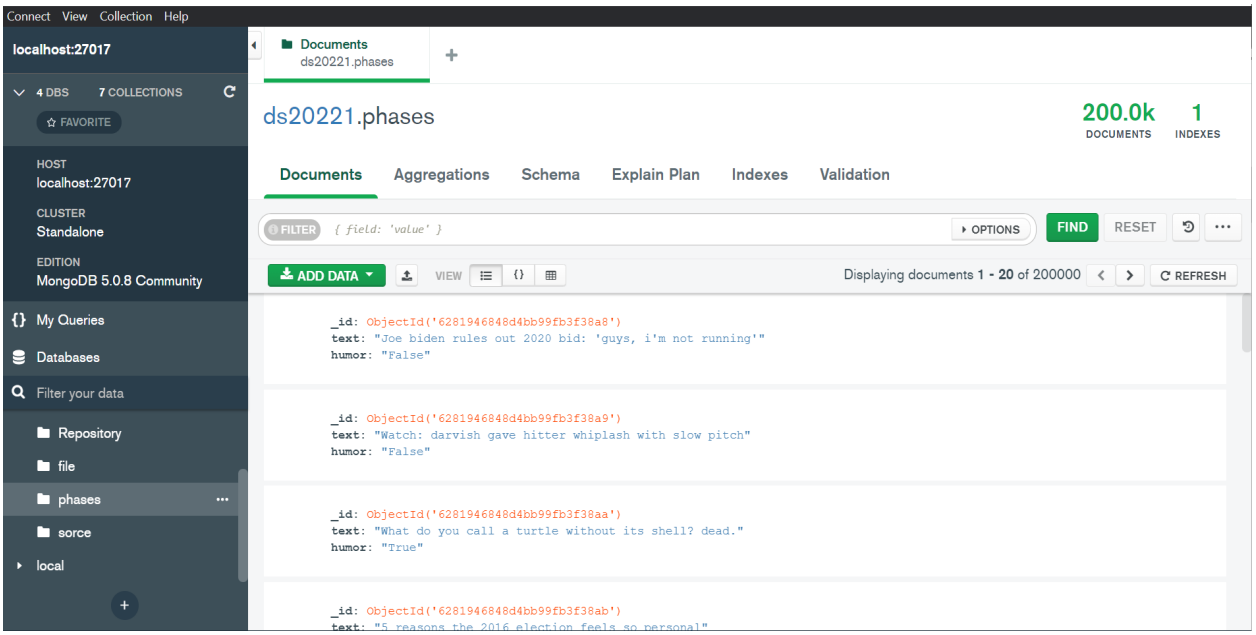
idPhrase	idFile	Phrase	Label
1	1	Joe biden rules out 2020 bid: 'guys, i'm not running'	0
2	1	Watch: darvish gave hitter whiplash with slow pitch	0
3	1	What do you call a turtle without its shell? dead.	1
4	1	5 reasons the 2016 election feels so personal	0
5	1	Pasco police shot mexican migrant from behind, new autopsy shows	0
6	1	Martha stewart tweets hideous food photo, twitter responds accordingly	0
7	1	What is a pokemon master's favorite kind of pasta? wartortellini!	1
8	1	Why do native americans hate it when it rains in april? because it brings mayflowers.	1
9	1	Obama's climate change legacy is impressive, imperfect and vulnerable	0
10	1	My family tree is a cactus, we're all pricks.	1
11	1	Donald trump has found something mysterious for rudy giuliani to do	0
12	1	How donald trump and ted cruz's love affair is all relationships	0
13	1	Want to know why athletes chose to #takeaknee? look at our broken justice system	0
14	1	How are music and candy similar? we throw away the rappers.	1
15	1	Famous couples who help each other stay healthy and fit	0
16	1	Study finds strong link between zika and guillain-barre syndrome	0
17	1	Alec baldwin and wife hilaria welcome another baby boy	0
18	1	Trump says iran is complying with nuclear deal, but remains a dangerous threat	0
19	1	Kim kardashian baby name: reality star discusses the 'k' name possibility (video)	0
20	1	I just ended a 5 year relationship i'm fine, it wasn't my relationship :p	1
21	1	Here's what the oscar nominations should look like	0
22	1	Dating tip: surprise your date! show up a day early.	1
23	1	Reflections from davos: leaders deliberate what's next for climate action after paris ...	0
24	1	What do you call an explanation of an asian cooking show? a wok-through.	1
25	1	Swimming toward a brighter future: how i was introduced to the world of autism	0
26	1	Why did little miss muffet have gps on her tuffet? to keep her from losing her whey.	1
27	1	The pixelated 'simpsons' should be a real couch gag	0
28	1	All pants are breakaway pants if you're angry enough	1
29	1	Watch: former british open champ makes embarrassing putting fail	0
30	1	Chrissy teigen's 2015 grammy dress is skintight and perfect	0
31	1	Ugh, i just spilled red wine all over the inside of my tummy.	1
32	1	The next iphone update will help you save lives	0
33	1	Celebrating the fourth of july with airport profiling	0
34	1	The big bend, a u-shaped skyscraper, could become the longest in the world	0
35	1	Oscars 2016 red carpet: all the stunning looks from the academy awards	0
36	1	Why do jews have big noses? because the air is free	1
37	1	Interesting fact: by the year 2020 all actors on american tv shows will be australian.	1

NoSQL implementation:

The deployment was done in MongoDB. MongoDB is a schema-free, document-oriented database written in C++. The choice of encoded format in MongoDB is JSON. This means that even if the data is nested inside JSON documents, it will still be queryable and indexable. As a document store based, it stores values (referred to as documents) in the form of encoded data MongoDB has a flexible storage system, which means stored objects are not necessarily required to have the same structure or fields. MongoDB also has some optimization features, which distributes the data collections across, being overall a more balanced and performance focused system.

It was created in MongoDBCompass, instance with the following features:

After that, the database schema “ds20221” was created and the tables according with the proposed model Repository, Source, File, Phrase:



e. A comparison of the relational and NoSQL databases implemented needs to be included, stating which of the two models is more suitable to handle your data.

Given the nature of our problem, we do not have a huge dataset that cannot be accessed efficiently ina relational way, actually it is not a Big Data problem nowadays. We have 200 thousand entries and our feature is really the text that is in a single column named “humor”. Additionally, in terms of computational complexity our target is simple, being ourtarget a boolean value that says if the given phrase in “humor” is funny or not. The complexity of our problem lies in the language analysis that could understand such a complex matter in the human relationship as humor is. On the other hand, considering that sql databases are more mainstream and easier to understand, the project can benefit from that fact in order to have better data management to whatever process may appear in the development of the project.

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