

21th May 2021
Project in Informatics Curricular Unit | Group 03



Imageable

Reimagine your past.

Objectives

The user shall be able to find images using text.

The user shall be able to add image folders for processing.

The user shall be able to find images using similar images.

The user shall be able to create and delete tags for and from images.

The system shall be able to perform facial recognition in images to create tags.

The system shall be able to detect objects in images to create tags.

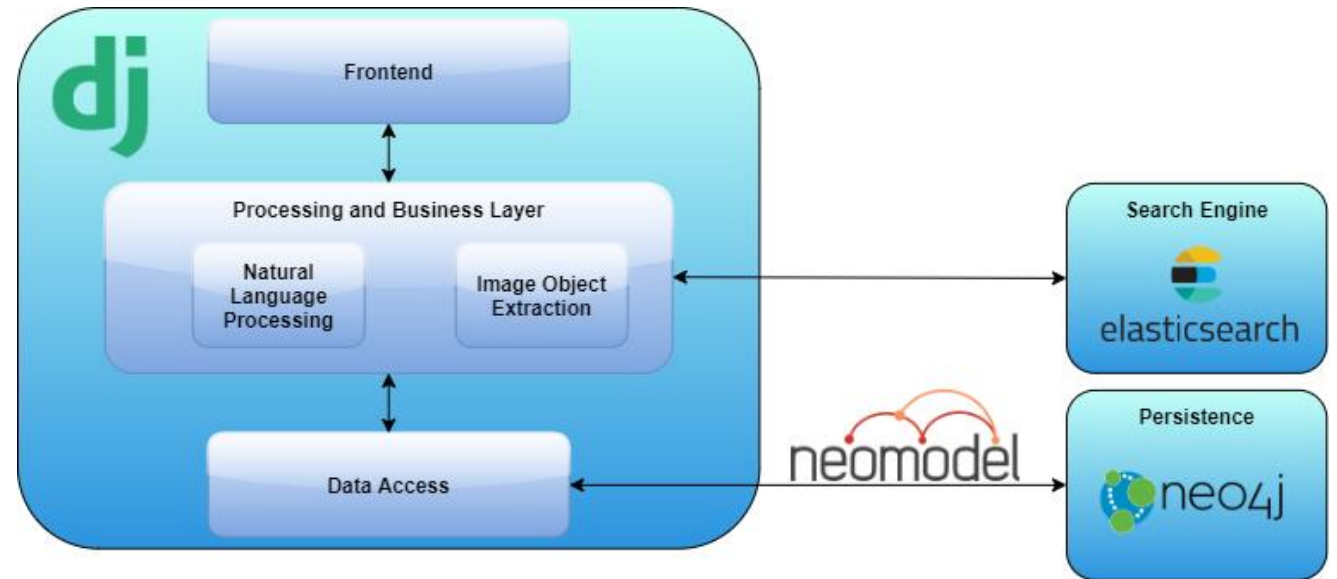
The system shall be able to detect patterns in images to create tags.

1st week

- 1st half – We started by exploring related projects like google photos and amazon photos.
- 2nd half - We created a slack for communication and registering notes about our weekly reunions (we had 2 per week one with the group and another with the client/supervisor/advisor) and confluence project group to track the tasks that each element was working on, if those tasks were completed and to set a deadline for each task.

2nd week

- 1st half – We started exploring many technologies, programming languages, databases, search engines, image processing, multithreading, among many others. And created an architecture diagram and a list of all the technologies we wanted to explore and use.
- 2nd half – We divided all technologies that we wanted to use to each element and each element made a small tutorial and learned how to use that technology.



Following weeks

- We had a working cycle we divided some tasks between all elements of the group.
- When the time arrived to integrate the technologies we started dividing tasks between groups of 2 elements, these groups were always composed of different elements based on the technologies each element trained and learned, until all technologies were integrated with each other and working.
- At the end we had every technology merged into a single project.

Technologies

- First of all we decided that python would be the best programming language based on how vast python libraries are.
- Then we wanted a offline API server that could run and startup in any home computer for this we wanted to use django.

Technologies

- Then we needed a way to extract features from images and for this we used
 - > VGG16 from tensorflow to extract features that would be used to compare between different images to see if they were the same image.
 - > dlib Facial Recognition to identify people in those images
 - > YOLO and COCO object extraction do identify objects
 - > Surroundings extraction to identify the background, for example if it is outside or a kitchen or a living room.
 - > Exif metadata to identify the location based on gps coordinates and the date of the image.
 - > Tesseract OCR (Optical Character Recognition) to identify possible words in images
 - > Breeds recognition (created in the [Tópicos de Aprendizagem Automática](#) course) to identify breeds if there is a cat or a dog in the image.

Technologies

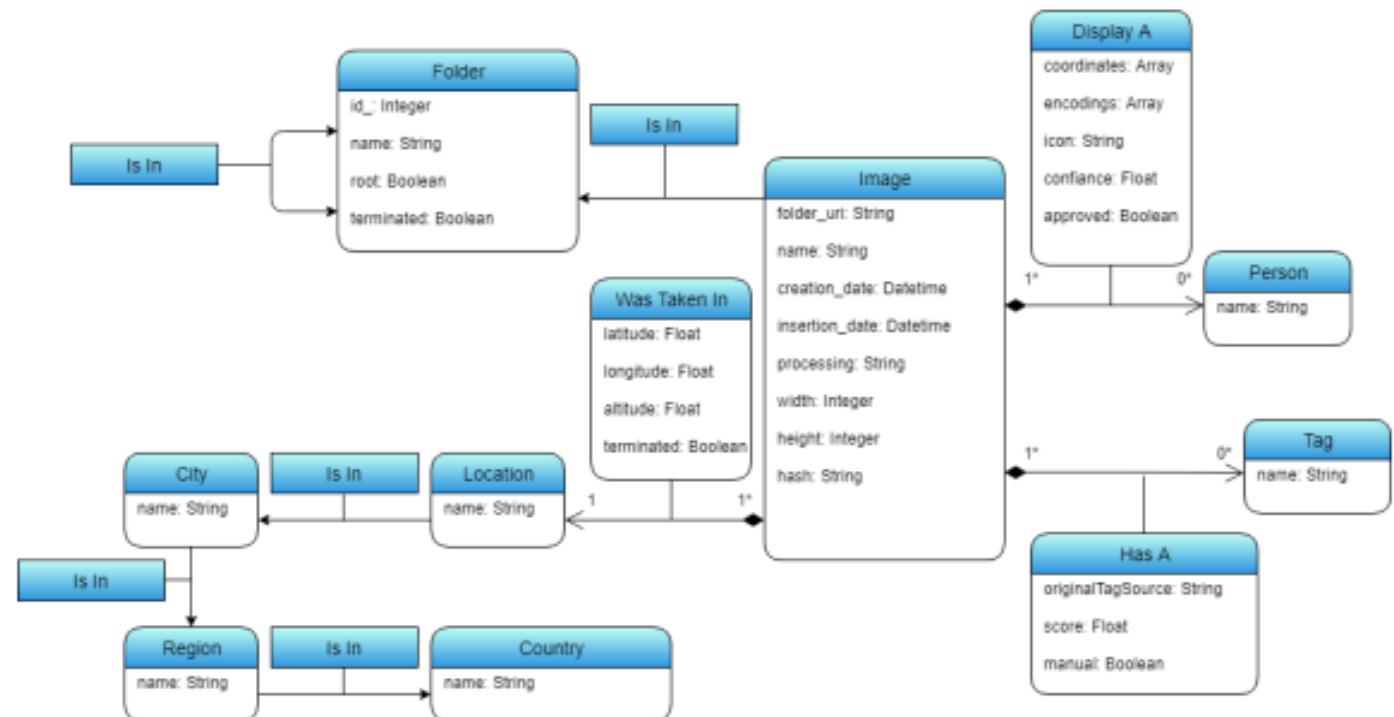
```
Stemming & Lemmatization

words = ["connects", "connected", "strange", "is", "am"]

stemmed = ["connect", "connect", "strang", "is", "am"]

lemmatized = ["connect", "connect", "strange", "be", "be"]
```

- But we still needed a way to store and search everything.
- For storing we chose neo4j and searching we used elastic search.
- But there is still a problem, that is how are the users going to search. We needed to get everything the user placed on the search bar and transform it into usable tokens, nlp (natural language processing) was very helpful.



Technologies

- Because our program was slow we also started exploring how to use threads and we integrated threads into:
 - The initialization phase of our program.
 - The folder / image processing phase.
 - The folder / image deletion phase.

Experience

- Our main focus was to learn as much as we could about everything, we wanted to explore many technologies that we never used and probably didn't know they existed and integrate them together.
- Our biggest problem was trying to make it a usable home application, because we had many problems trying to make a executable or even trying to install everything on another computer. Usually the installation would take a long time and sometimes it would cause an error during a python library installation.
- Elastic search was also a big problem, it would consume a lot of resources and if we had time we would probably look for a lighter search engine or our own search engine with inverted index for a quick and light search.

Further work if we had more time

- We also would enhance the page to edit people's names so that it works well with a big dataset of images.
- We would implement Named Entity Recognition in the NLP module.
- We would change how the executable runs, to be independent from Python.
- We would research how to create a installer.

Conclusion

- Our group just wanted to learn everything we could, so we just picked unique and fun technologies and explored them.
- The end result was a program we were happy with, even if it was difficult to install on other computers (it is possible! Believe me!).