



universidade
de aveiro



Imageable

Reimagine your past.

19th April 2021

Project in Informatics Curricular Unit | Group 03

CONTEXT

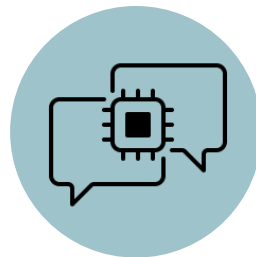
CONTEXT



Image Processing



Cataloging



Query (NLP)
Processing



ACTORS, PERSONAS, SCENARIOS AND USER STORIES

ANTÓNIO NOGUEIRA



Job Title
Retired

Age
84

Highest Level of Education
Fourth class

Goals


- Find photos of his grandson when he was younger through facial recognition
- Use of a user-friendly application

Frustrations

- Application not adapted to his vision problems
- Application with a high learning curve
- Slow processing times

Environment

Having only attended school for 4 years and worked all his life in the construction industry, he never showed curiosity in the area of technologies. He has a smartphone, but he can hardly do anything other than taking photos and copy them to his computer. He only uses his PC to play Solitaire and Candy Crush, because he doesn't have much patience to learn all the features that a computer can offer.



As **António**, I want to be able to filter the photographs without much difficulty, recurring to face recognition, so that I can make a special surprise for my grandson.

FILIPPE NOGUEIRA



Job Title
Actor

Age
25

Highest Level of Education
University (Bachelor degree)

Goals

- Filter photos by location to get the best photos of his wedding
- Intuitive and easy to use application

Frustrations

- Slow processing times
- Application crashes
- Not being able to make a compilation of the best moments of his wedding

Environment

Being a very active public figure on social networks like Instagram and Facebook, in addition to using his personal computer for his professional projects (such as preparing the scenes of the next episodes of the soap opera in which he participates), he finds new technologies and applications easy to handle. Since he is a very busy person with his professional projects, he looks for an application that is easy and quick to use that does not spend a lot of time to master.

As **Filipe**, I want to filter my photos by location, so that I can make a great compilation of moments from my wedding and share it with my fans.

ALEXANDRA PEREIRA



Job Title
Student

Age
21

Highest Level of Education
High School

Goals

- Search for the name of a cat that belongs to the association
- User-friendly application

Frustrations

- Not finding a home for all the cats she takes care of

Environment

She is not an expert in new technologies but she knows the basics of a computer. As long as she is able to produce leaflets for all the animals that are in the shelter where she volunteers, she already feels fulfilled.

As **Alexandra**, I want to search for the name of a specific cat from the refuge so that I can make leaflets and share them on social media.

JOSÉ CARLOS ALMEIDA



Job Title
Photographer

Age
43

Highest Level of Education
University (Bachelor degree)

Goals

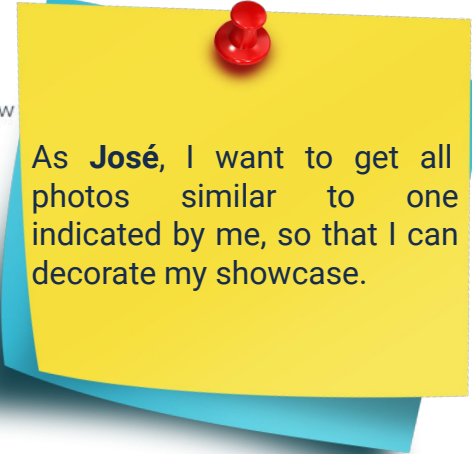
- Pick a photo and find similar images to decorate his shop window
- High performance application

Frustrations

- Slow processing times
- Application crashes
- Application with few features

Environment

He has no problem dealing with new technologies, since he is always up-to-date with the new technological devices that allow him to take photographs with better quality and less effort. For him, the important thing is that the application complies with the requirements that it proposed, allowing him to achieve his objectives, even if for that he has to learn all of its functionalities.



As **José**, I want to get all photos similar to one indicated by me, so that I can decorate my showcase.

VIVIANA NUNES



Job Title
Student

Age
20

Highest Level of Education
University

Goals


- Manually insert tags into photos to identify the festivals she attended
- An application that supports a large number of photographs

Frustrations

- Not being able to edit all the photos she has
- Slow processing times

Environment

Born in the 21st century, she does well with new technologies. She doesn't care if the application is not easy to use, as she believes she is able to use it anyway. For her, the important thing is that it allows an allocation of a large amount of data to be able to edit all of her photographs, so she would prefer that the application had a high-performance index.

A yellow rectangular sticky note with a red pushpin at the top center. The note is slightly tilted and has a soft drop shadow.

As **Viviana**, I want to edit manually each photo, adding the name of the festival and the year in which it was taken, so that I can remember all the good times I spent.

STATE OF THE ART

EXISTING SOLUTIONS



Google Photos

- Identify people, places and objects
- Recognize faces not only of people but for pets as well
- Recognize Celebrities
- Recognize geographic landmarks
- Group images by different subjects
- Recognize text characters



Amazon Photos

- Identify people, scenery and objects
- Recognize faces and facial expressions
- Recognize Celebrities
- Recognize text characters

EXISTING SOLUTIONS



Google Photos

- Tesseract OCR
- Vision AI
- Cloud Natural Language
- ElasticSearch



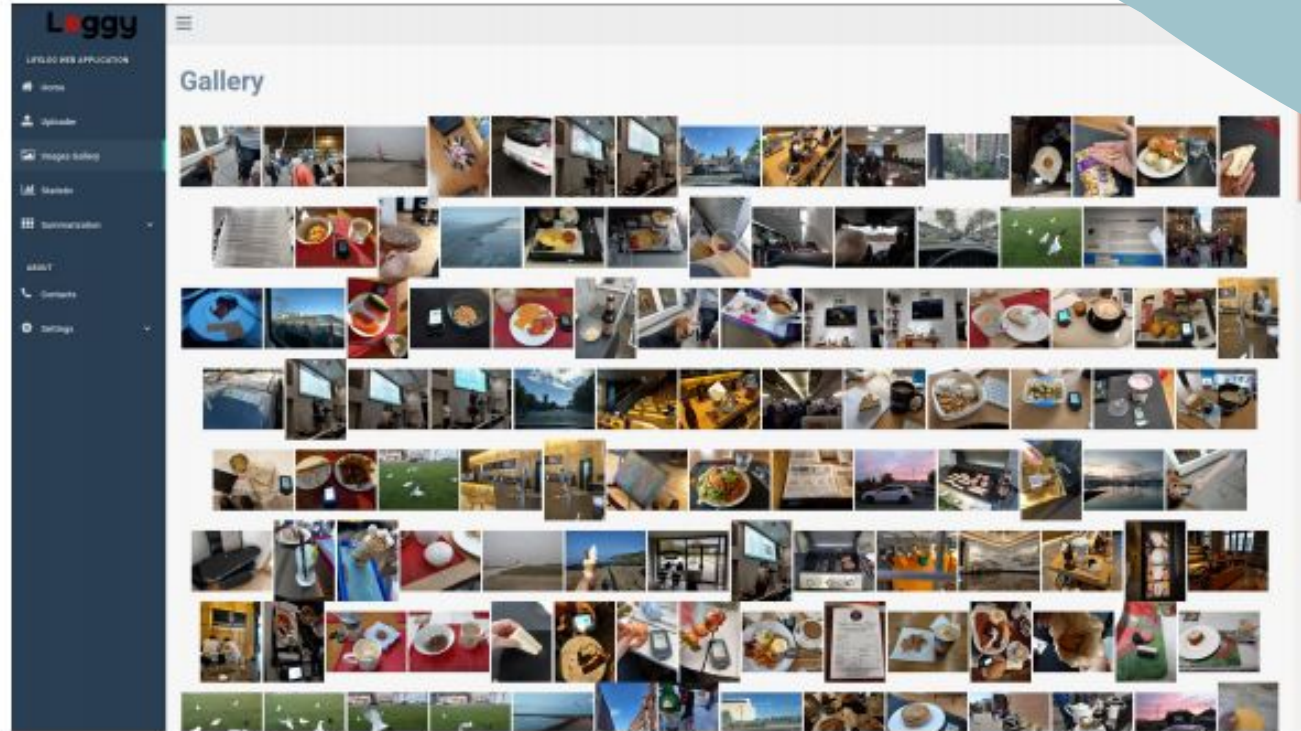
Amazon Photos

- Amazon Rekognition
- Amazon Elasticsearch Engine
- Amazon DynamoDB

LOGGY

Project being
developed by

Ricardo Ribeiro



REQUIREMENTS GATHERING

REQUIREMENTS GATHERING



Brainstorming



SOA Analysis



Discussion with
Advisors

FUNCTIONAL REQUIREMENTS

FUNCTIONAL REQUIREMENTS

- 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.
- The system shall be able to filter images by tags.

NON-FUNCTIONAL REQUIREMENTS

NON-FUNCTIONAL REQUIREMENTS

- Software must be compatible between OSs without creating problems.
- Always available in offline mode.
- Only the current pc user may access the images submitted by that user.
- The users may add password protection for the application.
- The app needs to handle a large amount of processing images at the same time.
- When searching with text on > 100 000 images we must assure that the app takes around 5 seconds.
- When searching with an image on > 100 000 images we must assure that the app takes around 5 seconds.
- It should register if there is an incorrect password attempt and if there is any error that occurred.
- It should warn the user in case there is an error while processing an image.
- In case of an error that can be avoided it should be easily fixed without the user even knowing.

OUR LIBRARIES

A word cloud visualization of the text "Natural Language Processing is the study of how humans communicate with computers using natural language. It is a branch of artificial intelligence that deals with the interaction between human language and computers. The goal of NLP is to enable computers to understand and process human language in a way that is similar to the way humans do. NLP is used in a variety of applications, including machine translation, text summarization, and sentiment analysis. NLP is a challenging task because human language is highly complex and context-dependent. However, with the help of machine learning and deep learning, NLP has made significant progress in recent years. NLP is an exciting field of research and it is expected to continue to grow in the future." The words are arranged in a circular pattern, with "Natural Language Processing" and "NLP" being the largest and most prominent. Other visible words include "study", "humans", "communicate", "computers", "using", "artificial intelligence", "branch", "interaction", "human language", "goal", "enable", "understand", "process", "human language", "way", "similar", "humans", "do", "NLP", "challenging", "task", "highly complex", "context-dependent", "help", "machine learning", "deep learning", "significant progress", "recent years", "exciting field", "research", "expected", "continue", "grow", "future".



IMAGE OBJECT EXTRACTION



ImageAI



TensorFlow

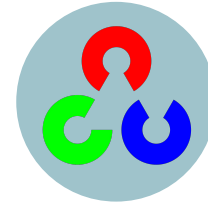


Microsoft
COCO

FACIAL RECOGNITION



Dlib



OpenCV

PLACES365

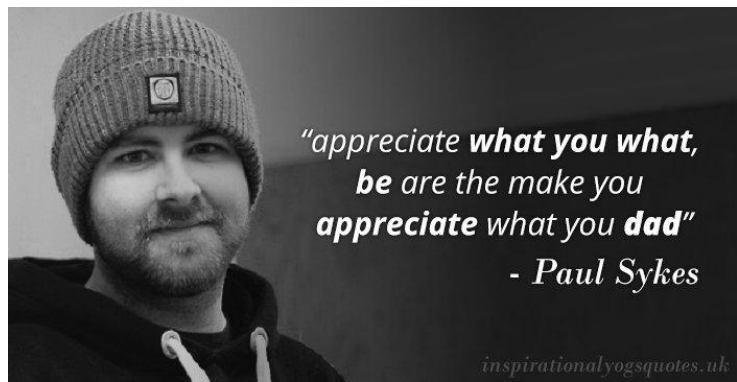
- Scene recognition dataset
- 1.8 million train images from 365 scenes



```
0.663 -> food_court  
0.179 -> cafeteria  
0.048 -> dining_hall  
0.024 -> market/indoor  
0.018 -> flea_market/indoor
```




Tesseract OCR



"appreciate what you what,
be are the make you
appreciate what you dad"

- Paul Sykes



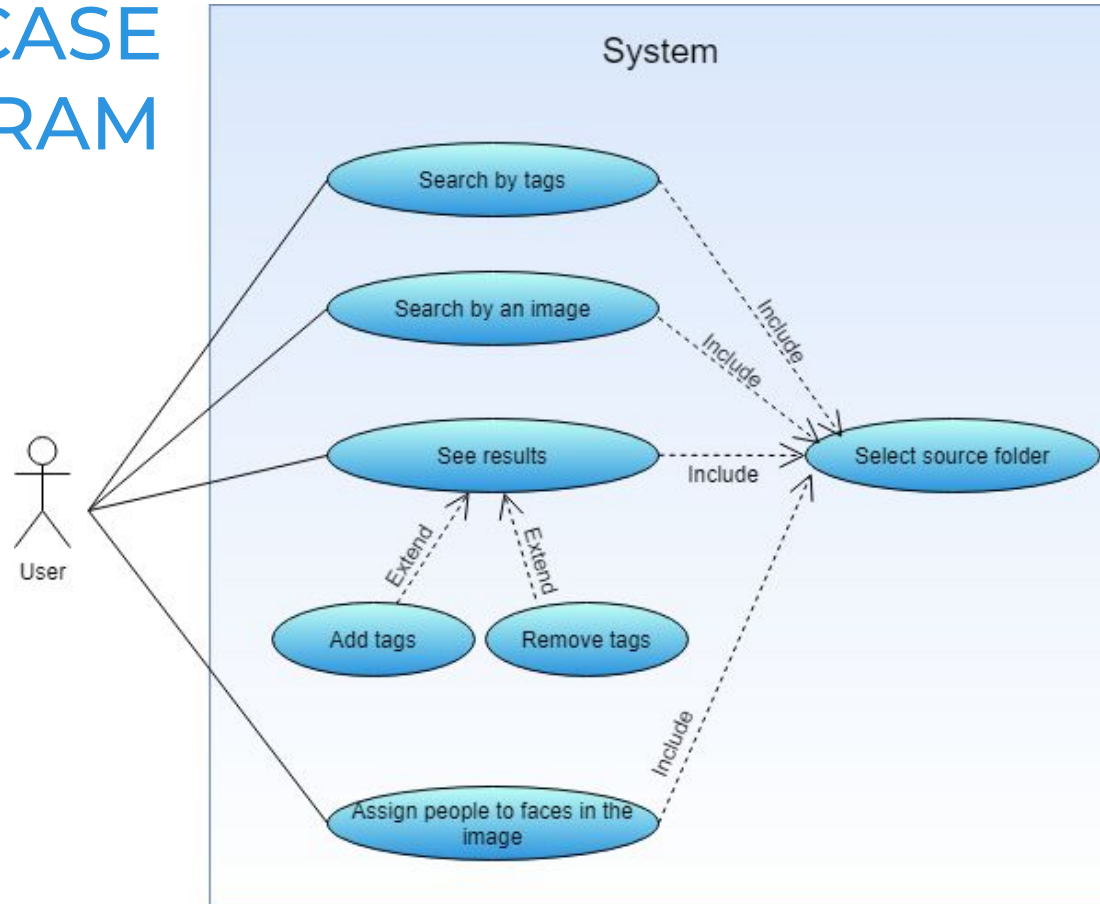
elasticsearch

Search by tags [dog, cat, ball]:

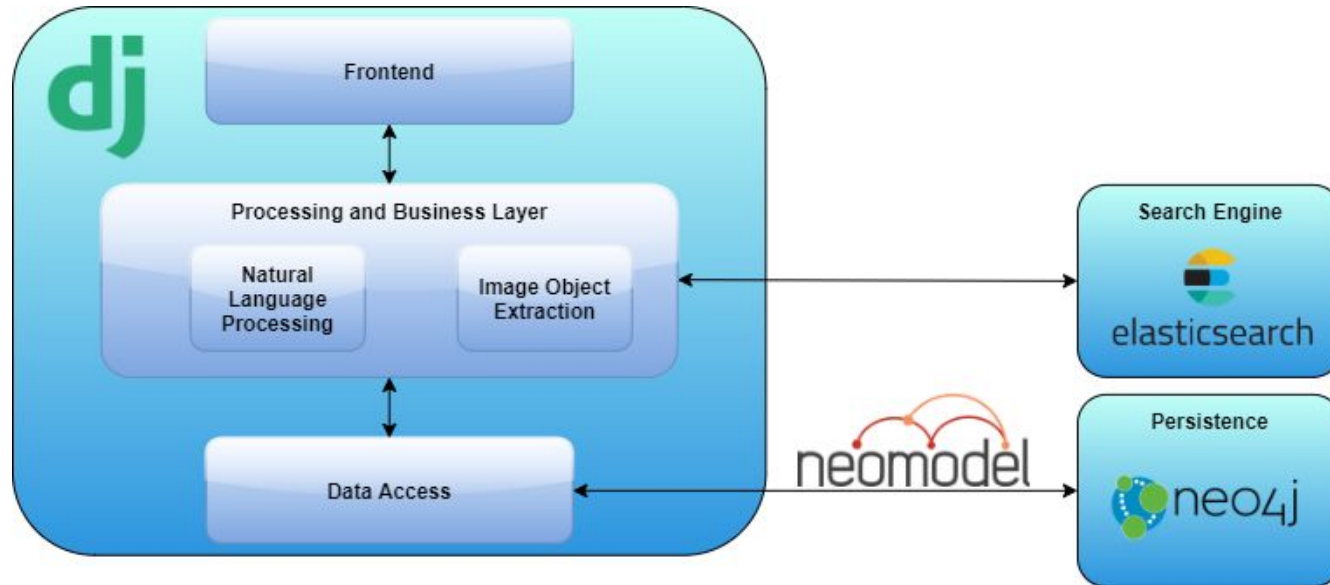
```
score: 2.2417462, uri: D:/images/testImage1, tags: ['dog', 'ball', 'cat']  
score: 1.149302, uri: D:/images/testImage2, tags: ['ball', 'cat']  
score: 0.0568578, uri: D:/images/testImage3, tags: ['cat']
```

SYSTEM ARCHITECTURE

USE CASE DIAGRAM



ARCHITECTURE DIAGRAM



DOMAIN MODEL

