GIRAFFE RECOGNITION PROJECT

CS 526

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PROJECT OUTLINE

- **Motivation**

- **System Overview**

- **Mockup Interface**

- **System Architecture**

- **Division of Labor &Project Timeline**

- **Future Work**

- **References/Resources**

- **Acknowledgements**

MOTIVATION

- Our inspiration comes from the 'Giraffe Project' guided by Prof. Lesk and Kristina.

- There are millions of pictures captured in San Diego Zoo, the underlying goal is to use image processing technology to count and monitor giraffe populations.

- Based on the underlying goal, our goal is to develop a system that can identify the pictures whether there are giraffes in them.

SYSTEM OVERVIEW

- Data Collection

- The millions of pictures taken by more than 100 cameras in San Diego Zoo, Kenya.

- These pictures may contain different animals such as giraffes, zebras, baboons, cattle, or even human beings.

- Only the pictures which contain giraffes are useful to us.

CameraName 46℉7℃ 02-05-2015 19:17:51

CameraName 46℉7℃ 02-05-2015 19:20:42

CameraName 89℉31℃ 02-05-2015 01:13:30

CameraName 71℉21℃ 02-04-2015 21:44:50
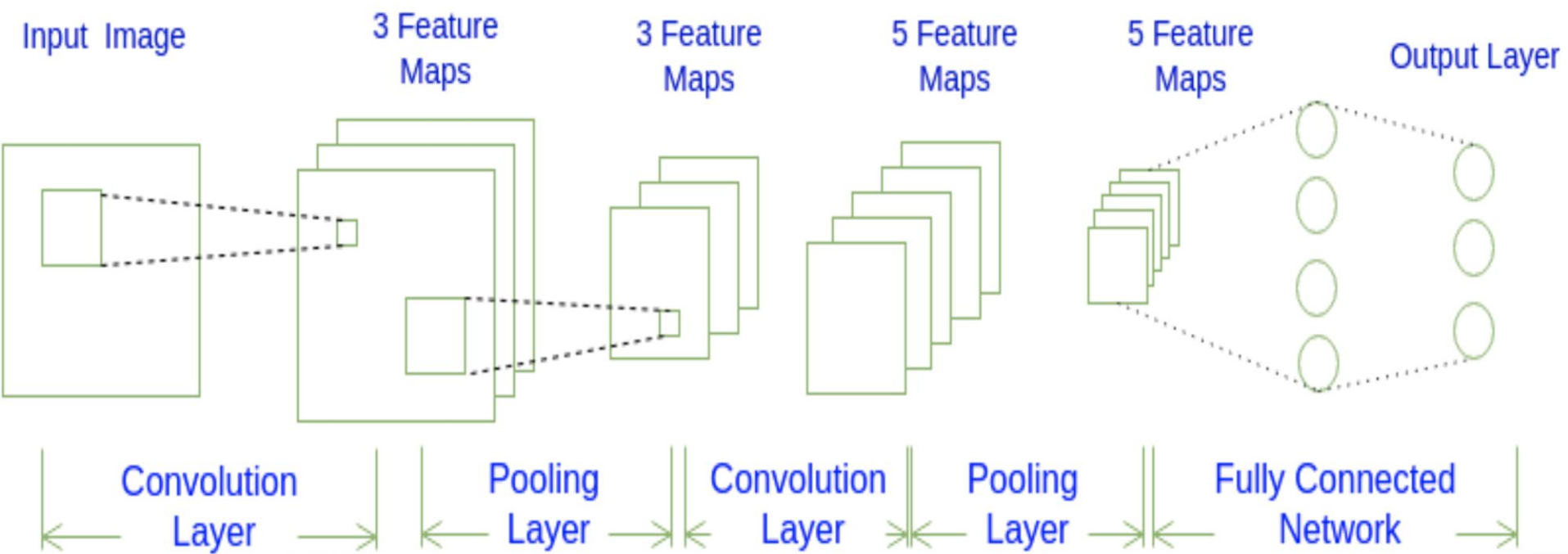
SYSTEM OVERVIEW

- ## Implementation Steps

o Sort out the useful pictures.

o Use these pictures to train machine learning models to identify whether there are giraffes in these pictures.

o Use the test set to modify or rebuilt our models until we get a decent test result.

o Build the user interface which enable users to upload pictures, and write scripts to enable the system to identify if there are giraffes in these pictures.

SYSTEM OVERVIEW

- Tentative Ideas of Model Design

  o Given the high performance of pattern recognition on computer vision, we plan to implement a Convolutional Neural Network(CNN).
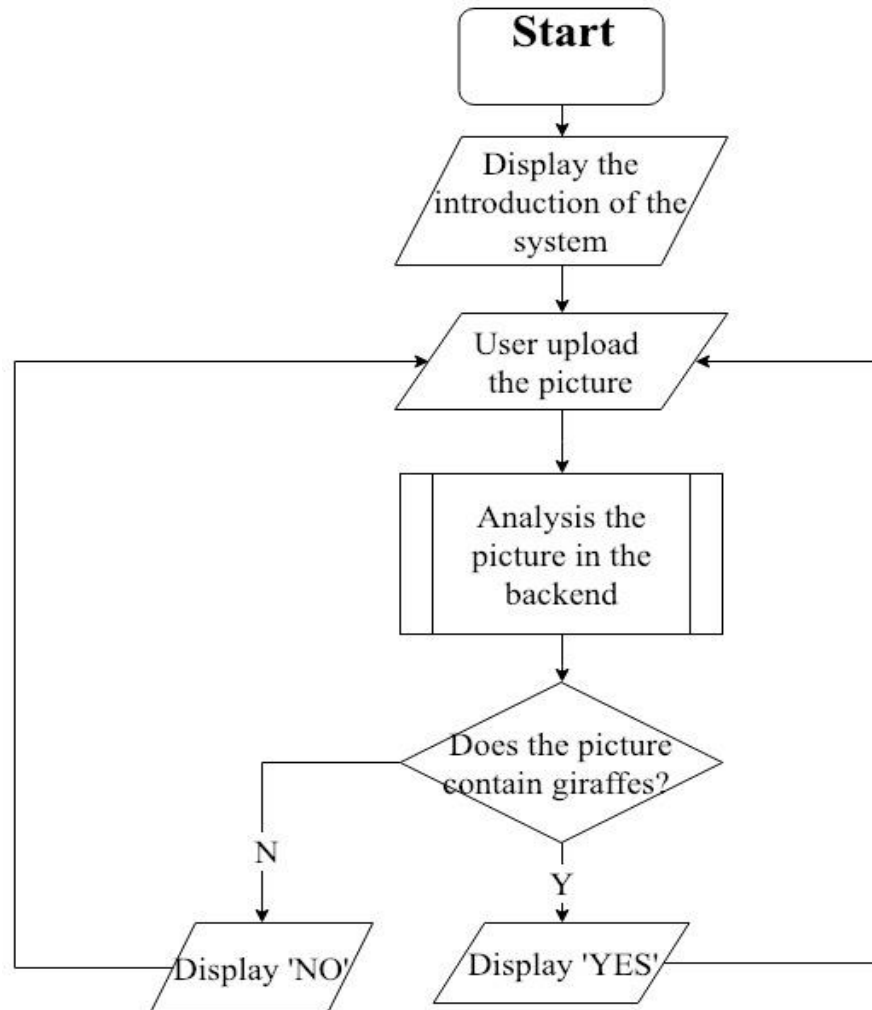
Input Image — Convolution Layer — 3 Feature Maps — Pooling Layer — 3 Feature Maps — Convolution Layer — 5 Feature Maps — Pooling Layer — 5 Feature Maps — Fully Connected Network — Output Layer

A tentative idea of CNN model

SYSTEM OVERVIEW

- Flow Diagram

MOCKUP INTERFACE

Giraffes! CS526 Exibition

Overview   Photo's   Achiements   Demo   Contact

Welcome page

MOCKUP INTERFACE

scenario 1: Regular

Giraffe individuals with **regular actions, regular locations, clear picture quality** and **enough light.**

See more pictures!

scenario 2: Irregular

Giraffe individuals **acting unusually,** like lying on the ground with diverse postures, tangling necks around each other,etc.

See more pictures!

scenario 3: Shadow

Some pictures were taken at **special times,** like at night, or during the sunset, which may be beautiful but difficult to recognize.

See more pictures!

Introduction of scenarios

MOCKUP INTERFACE

What we did...

We developed a giraffe photo recognition application with machine learning techonoligies...

ACHIEVEMENT1 TITLE
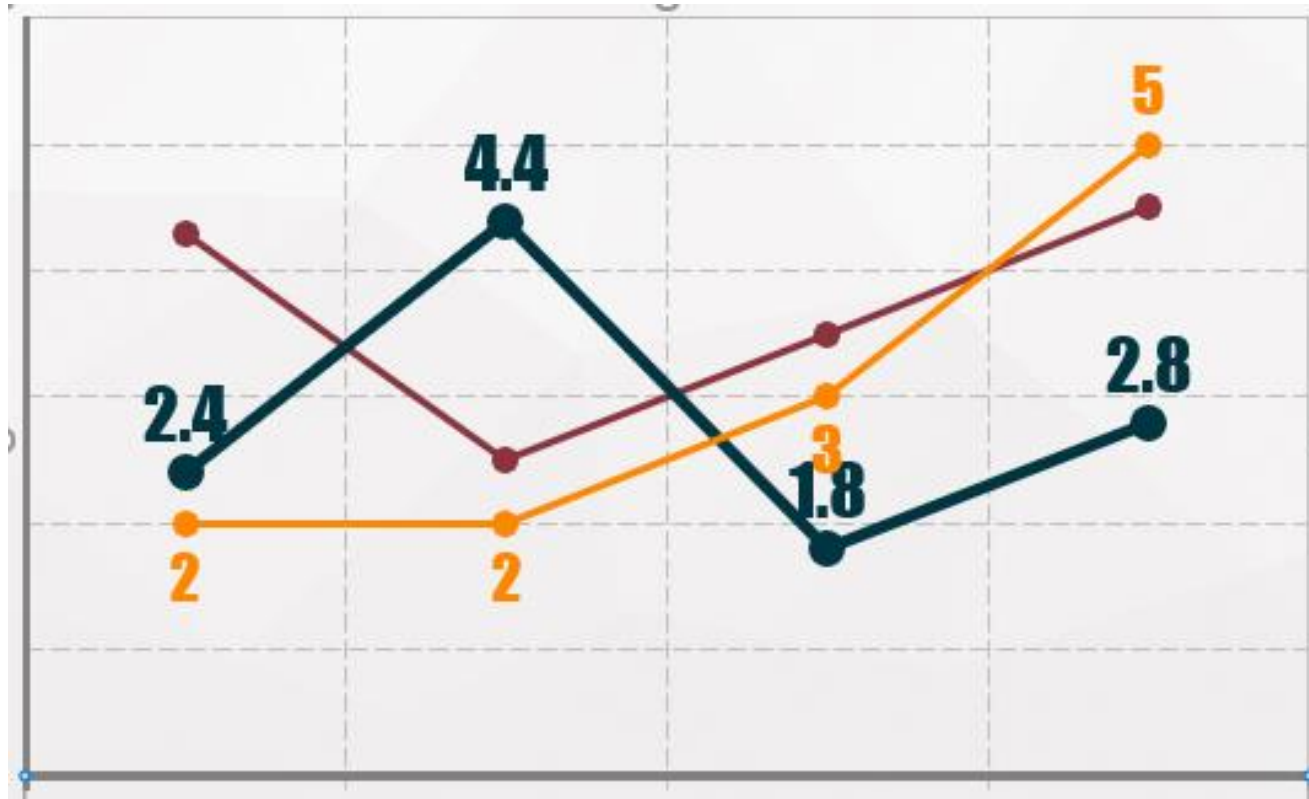
VISUALIZATION

Visualization Details

Built a website to demonstrate our results with visualization tools (D3.js)

Achievement Introduction

MOCKUP INTERFACE

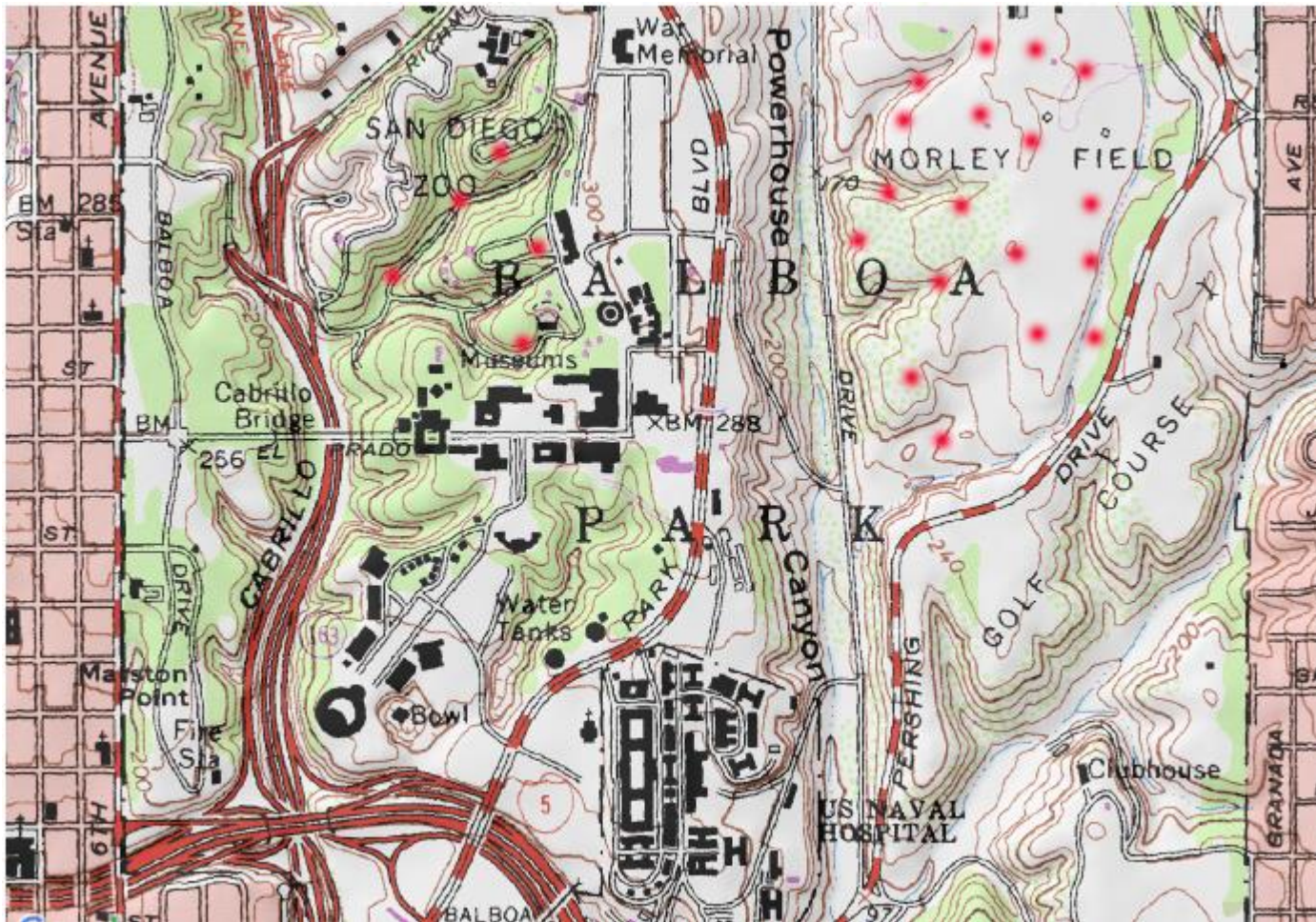Variation of giraffe numbers on each camera

Visualization

MOCKUP INTERFACE
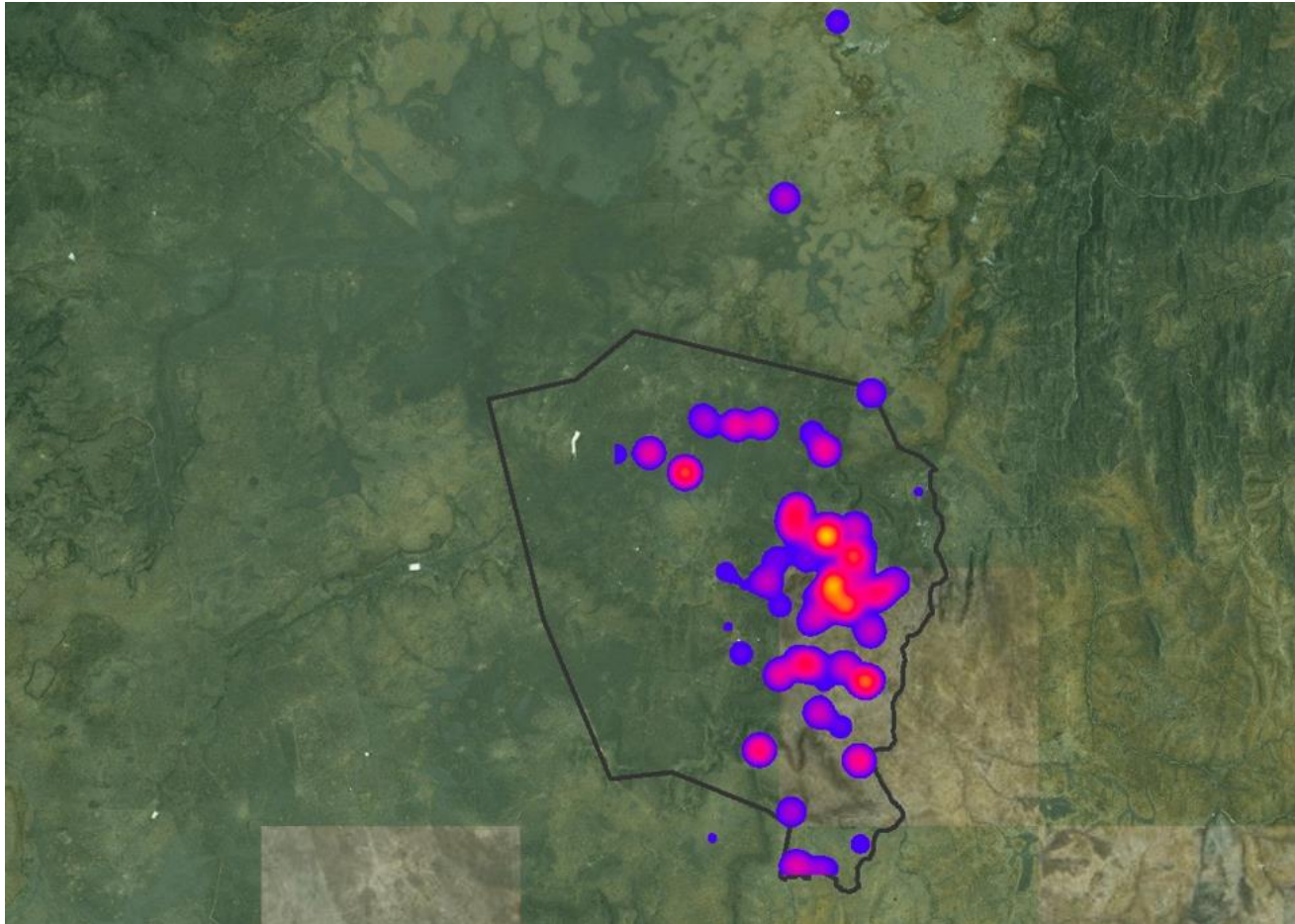
Floating tendency based on camera locations

Visualization

MOCKUP INTERFACE
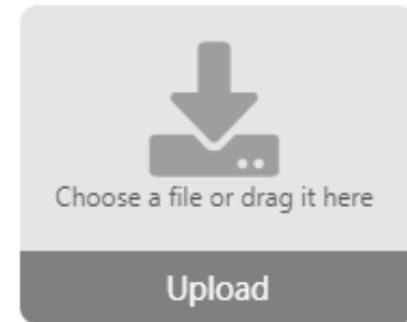
Floating tendency based on camera locations

Visualization

MOCKUP INTERFACE

Demo

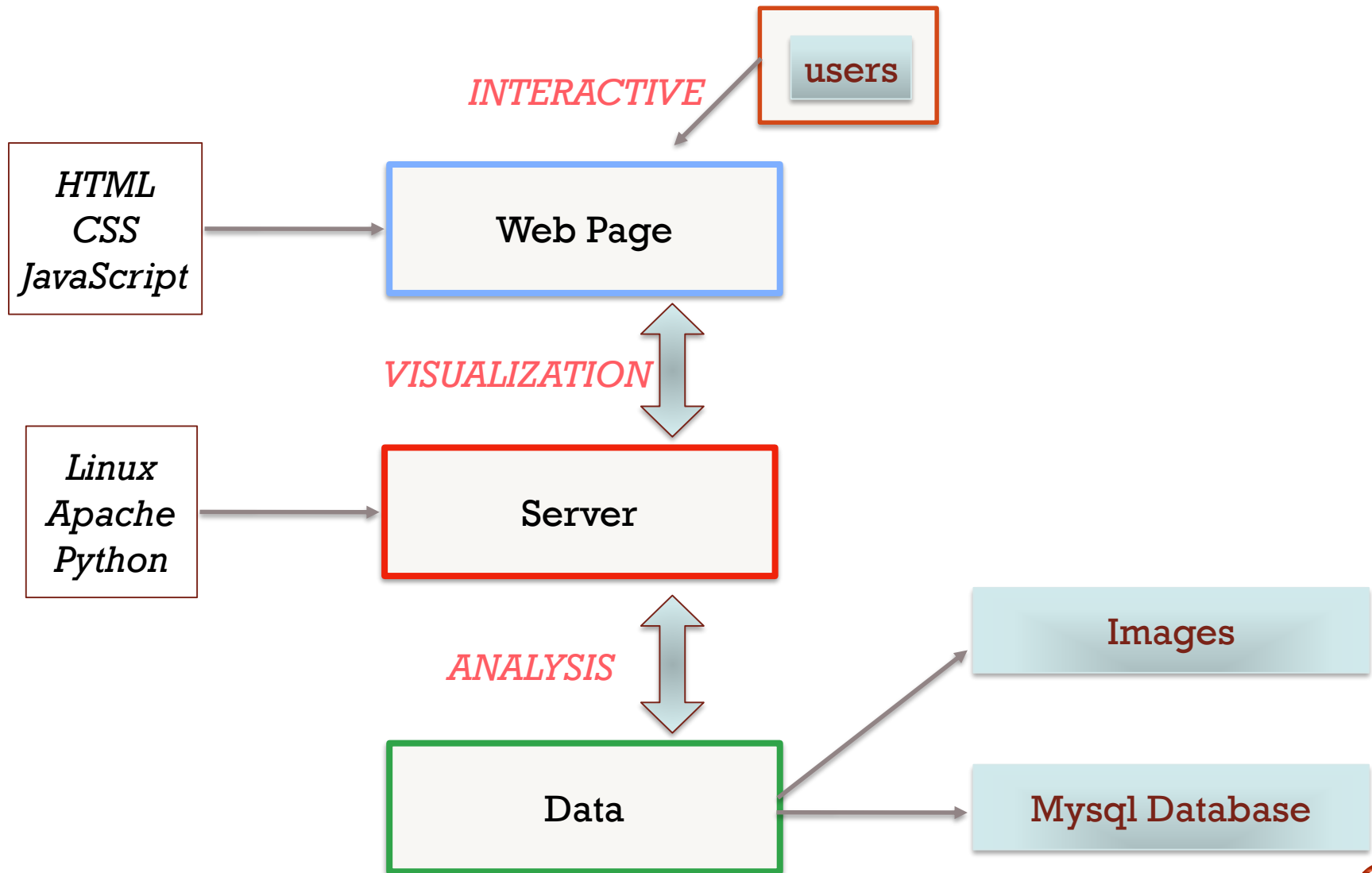Upload a high quality picture of giraffes and recognize them with our system!

Choose a file or drag it here

Upload

You are welcomed to check our demos
HERE!

Upload the picture here.

SYSTEM ARCHITECTURE

users

INTERACTIVE

HTML
CSS
JavaScript

Web Page

VISUALIZATION

Linux
Apache
Python

Server

ANALYSIS

Data

Images

Mysql Database

DIVISION OF LABOR &PROJECT TIMELINE

- W1 - 3: Decided & Wrote the project proposal.

- W4 - 6: Design Algorithms & Train Models

- W7 - 9: UI design & Webpage development

  Chengyuan Deng (Front web page)

  Xiao Liu(Back end scripts)

  Jiapeng Zhang(Algorithms and models)

- W8 -10: Integration & Write-up

FUTURE WORK

- The project could be expanded by determining **other class projects that will benefit from our group work.** **They are:**

o **Computer Vision**

o **Machine Learning**

o **Artificial Intelligence**

- We hope to recognize pictures with multiple animals and count them.

FUTURE WORK

- We would eventually like for our project to become open source where users can interact differently by sharing their opinions and codes and building a community together.

- We are expecting a future achievement of our application that we could eventually locate the giraffe and count the numbers together with the environmental parameters(e.g. temperature, humidity), so that we can track the status and number of giraffes and take necessary actions to protect them from endanger.

REFERENCES

- https://institute.sandiegozoo.org/science-blog/wildwatch-kenya-preliminary-results-field

- http://www-cs.ccny.cuny.edu/~wolberg/capstone/opencv/LearningOpenCV.pdf

- https://docs.fast.ai/

RESOURCES

- OpenCV
- FastAI
- HTML/CSS
- jQuery
- Python (Django)

ACKNOWLEDGEMENTS

- We would like to thank Prof. Abello for inviting Prof. Lesk to introduce this project, and much appreciate to M.Lesk and Kristina Plazonic for guiding this project and providing us plenty resources for us to do research.

THANK YOU!