Conjugate - Cloud Web Application Framework

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Introduction

Conjugate is a web application that provides a common platform to run different types of computer vision (machine learning) algorithms on uploaded images and display results with text and box annotations. It is a light Flask web app so it runs on any device that has a web browser.

Tools and Software

Web App Development -
- **Flask Framework**
- **HTML**
- **CSS**
- **JavaScript**
- **JQuery**

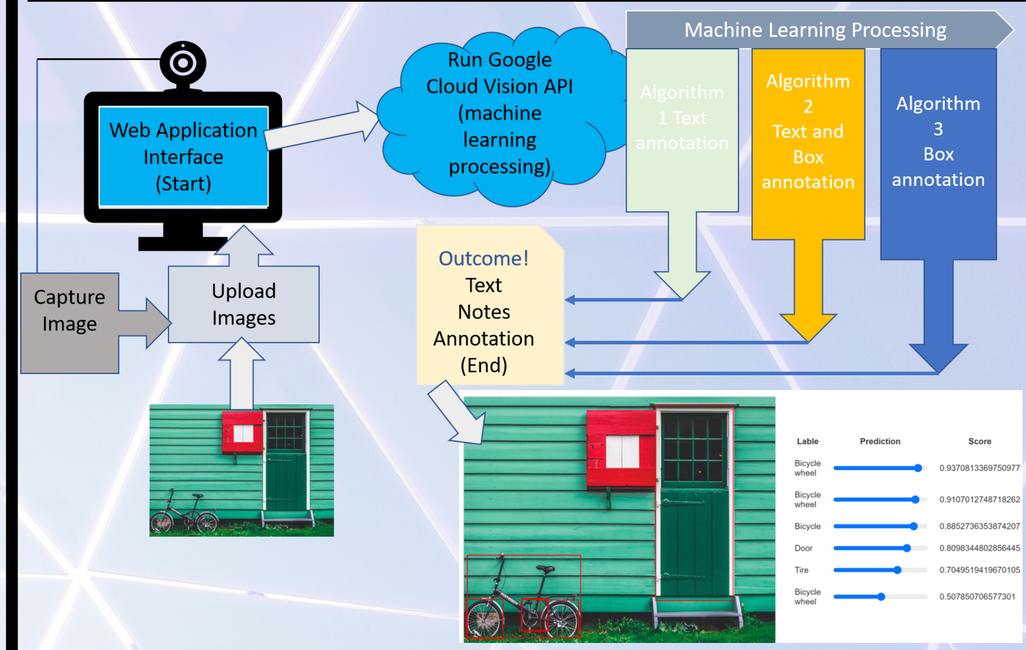
Project management -
- **GitHub**
- **Slack**
- **Trello**

Machine Learning Processing -
- **Google Cloud Vision API**

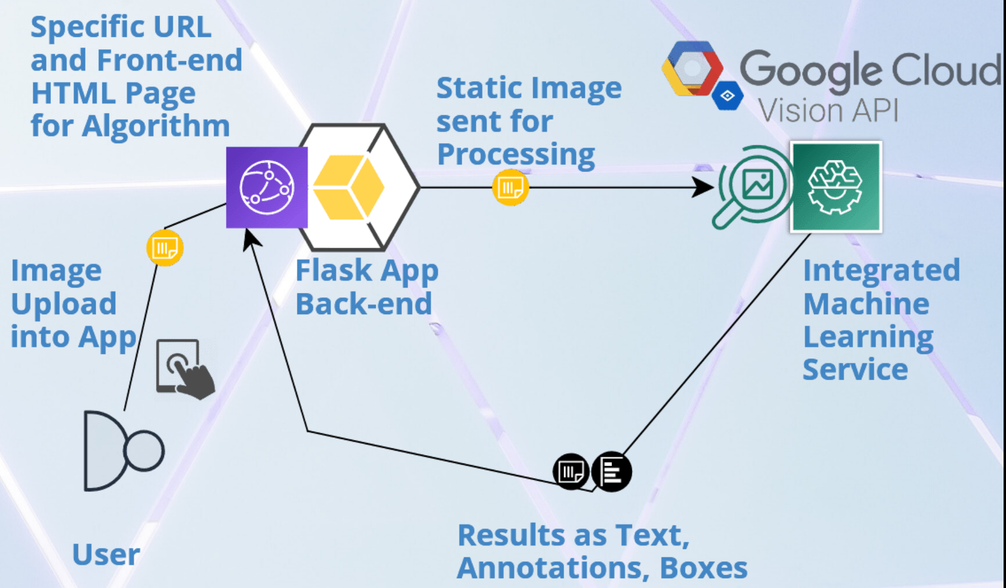
Achievements

Original Requirement -	Final Deliverable -
• A mobile app	• A web app - more efficient and agile and can easily run on any device
• Upload and capture image from device	• Same as planned. Capture works but requires uploading
• Separate pages for running different algorithms	• Same as planned
• Display text and box annotation on image as results after machine learning processing	• Same as planned
• Simple and friendly webpage and interface	• Same as planned
• Use Docker containers for managing machine learning algorithms	• Google API connected to demonstrate machine learning processing and results

Key Concept



System Architecture



Milestones

Milestone 1 -
- **System Architecture**
- **Develop Home page with User interface**
- **Implement image uploading**
- **Attempt Docker for Machine Learning**
- **URL based switching**
- **Implement an About Page**
- **Draw line and box type annotations with hard coded values**

Final Milestone -
- **Implement Google Cloud Vision for ML Processing**
- **Implement Image Capture**
- **Improved user interface**
- **Draw annotation using Vision Api**
- **Draw Text annotation for algorithm 1**
- **Draw Box annotation for algorithm 2**
- **Draw text and box annotation for algorithm3**
- **Handle data with JSON**

Extensibility

- **Platform to teach about different machine learning and computer vision algorithms or compare performance /results.**
- **Enhancement to use the application for image labeling, facial recognition, text recognition and auto-classification.**
- **Decoupling of application components for large scale processing on any cloud platform and upgrade to a public API that can be used universally.**
- **Cross-platform framework based app that can be on Android and iOS App.**

Conclusion

The web application successfully runs machine learning algorithms on an uploaded image and displays results like text and box annotation. It is easy to use while being able to integrate multiple machine learning algorithms on different pages.

Due to integration complications and team's limited exposure to Docker and limited time, Google Vision API is used to run ML algorithm instead of Docker. However the app can be extended or integrated with Docker and used with or without public cloud platforms like AWS, Azure and GCP. Therefore, the application is able to demonstrate different types of visual annotations on an uploaded image conveniently.

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