CS 189A
Fall 2017

Vision Statement

Capstone Project

Team Perception
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Product Name: Perception Engine
Project Goal: Object detection/tracking in a video given a target specified by an image.

Team Perception

Position	Name	Contact
Team Lead	Abhishek Bhattacharya	Abbirdboy@gmail.com
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Problem

Our partnered company, Aerospace Corp., seeks to analyze a large video database, in which objects should be recognizable and trackable. Currently, Aerospace does this manually by having humans watch the video and map out the object trajectories. But, now they would like to automate that process.

Project Outcome

The video data with an overlay to depict the trajectory/path of an object of interest is generated by our program automatically.

Specifications
- Input: Target Image, Video recording
- Output: Streamed (x, y) coordinates, (height, width) bounding box of the target object. At end, a processed video is outputted which has the tracking overlay.
- Action: The program finds the object in the video and outputs the current location for bounding object and it's size.

Design
- Convolutional neural network to identify desired object
- Convolutional neural network to identify object in video
- Computer vision to locate and track identified object in video
- Post processed video has overlay tracking image

Project Milestones

1: Convolutional neural net(CNN) correctly identifies objects in given picture
2: CNN correctly identifies objects in a set of video frames
3: CNN correctly identifies all objects in the video
4: The desired object and its representation in the video are linked together (lables are mapped to each other).

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5: Desired object coordinates in the video are correctly outputted
6: Desired object is correctly tracked in video through an overlay
7: There is an intuitive GUI to interact with our program

Stretch Goals
Unordered

- Run it on an embedded system
- Run object tracking on a live video stream
- Basic web-app frontend
- Basic iOS-app frontend
- NLP parsing of desired object
- Native iOS-app using CoreML and ARKit

Solution

Implementation platform and technologies

1: Python base project language
2: PyTorch/TensorFlow Neural network (TODO decide with mentors)
3: Scikit-learn/Scikit-image for Machine Learning libraries
4: OpenCV Library for object tracking

Process model to acheieve milestone

1: Anaconda/PyEnv for enviroment management
2: GitLab for project repository
3: GitLab Issues for issue tracking
4: GitLab CI/CD for continuous integration/continuous delivery
5: Trello for task management
6: Trello for burndown and retrospective data
7: Google Doc for scribe notes