SD08 - Sync & Split

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What is our project/problem being addressed

What is sync & split

- Multiple video sync
- Event detection using OpenCV
- Split the videos to isolate events
- Non-Functional features
    - App that is able to be used on multiple OS
    - Fast video loading
    - Video storage for split videos



Design & Development Challenges

Core Design Constraints

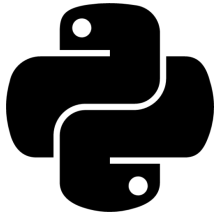
- Frontend:
  - Typescript
  - Expo
    - API Framework, additional tools
    - Mobile compatibility





- Backend:
  - Django
    - Web framework
    - ORM, Authentication





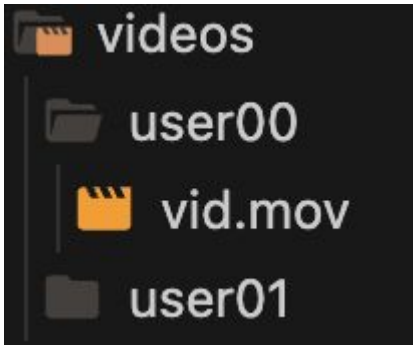
Mobile vs Web Video Compatibility

React Native and Expo

- Built-in media handling
  - URIs in base64
    - Incompatible with current web design
    - Must convert to local path
      - base64 -> bytes -> blob -> local URI

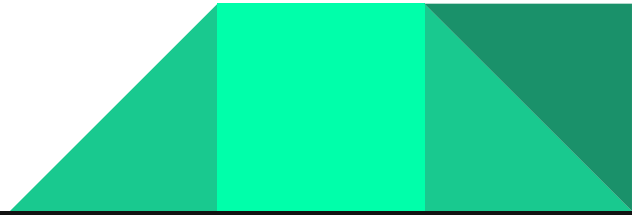
Video Uploading

- Database are inefficient for video storage
  - Slow performances
  - Increased query time and resource usage
- Instead, store metadata in DB
  - Video-User relation
- Videos located on VM
  - Tied to user ID



Detecting Events

- You Only Look Once - Object detection
- OpenCV - display object detection to user



Software development tools used

Tools use

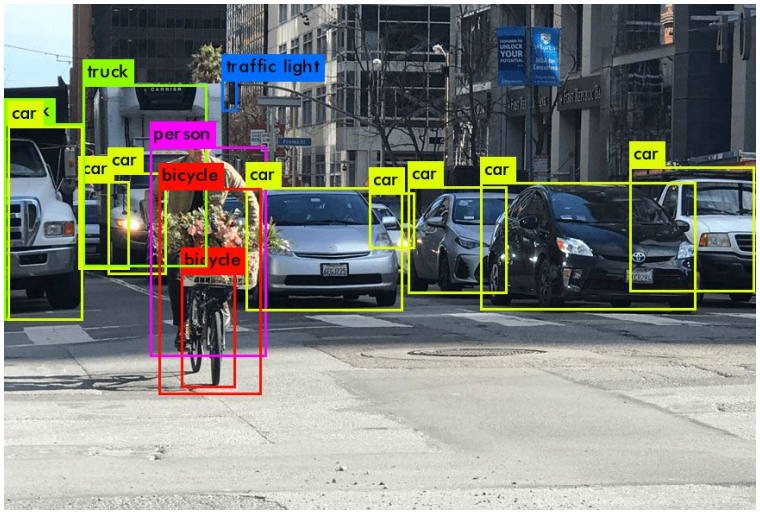
- Open CV (Open Source Computer Vision Library)
  - Wide range of built-in functions for image manipulation, video processing, feature detection, and object tracking



OpenCV

Tools use

- Yolo (You Only Look Once)
  - Real-time object detection system (MORE PRECISE)
  - Identify and classify objects



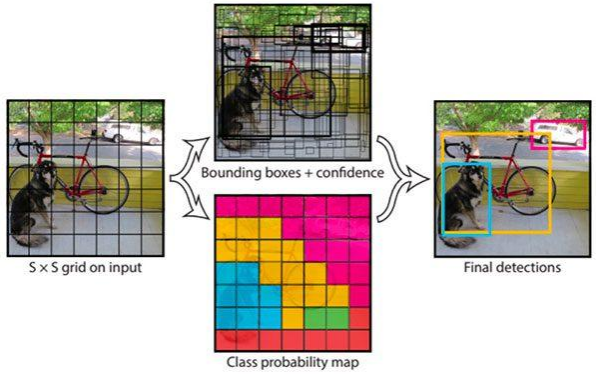
How To Use both?

Opencv:

- Adjust the image & video format, resizing, and preprocessing video frames to prepare them for analysis

Yolo:

- YOLO utilizes deep learning models to detect objects within the frames



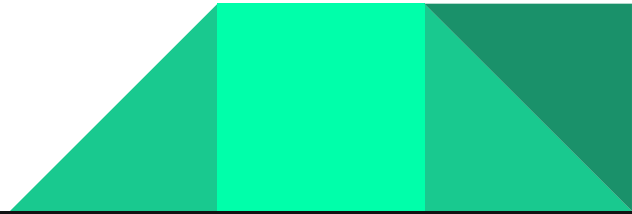
Current progress status and challenges

Current progress status

- Frontend
  - Figma website mockups created.
  - Expo used to create our front end pages.
  - Multiple pages created such as login/signup, video display, etc.
- Backend
  - SQL database to keep track of users.
  - Video upload and storage.
  - Car tracking and logging process.
  - Video splitting process.

Progress challenges

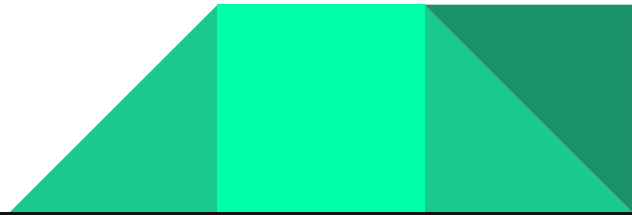
- Frontend
  - Difficulty working with expo.
  - Cross platform user interface views.
  - Local video upload inefficiencies.
- Backend
  - Understanding the requirements and what the client wants.
  - Figuring out ways to sync separate potentially unrelated videos.
  - Deciding what is an “important event”.
  - Finding useful test footage.



Remaining work timeline

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- 6 sprints, each two weeks
  - Currently halfway through our second Sprint
- Plans for each Sprint:



Remaining work timeline

Sprint 2 (in progress)

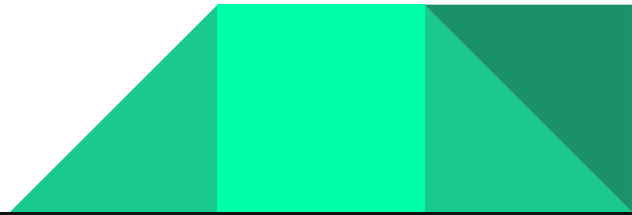
- Roundtrip
- User accounts/load info into app
- Video upload
- Play around with OpenCV/YOLO models
    - YOLO = You only look once

Sprint 3

- Connect VM
- Complete “Sync” phase
- Make Views for “Split” phase

Sprint 4

- Adjust Expo views for cross-platform compatibility (mobile)
- Start “Split” phase, extract clips with YOLO and be able to view clips



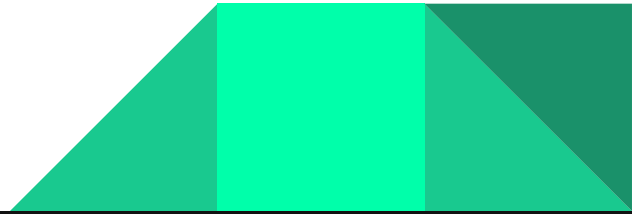
Remaining work timeline

Sprint 5

- Differentiate user types/capabilities and privileges
- Finish “Split” phase, make tweaks and additions to extraction algorithm(s)

Sprint 6

- Dedicated to fine tuning and making final adjustments (the last week of this Sprint is dead week)



Demo