IDENTIFYING ADA FEATURES THROUGH THE USE OF VIDEO LOG IMAGES

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OVERVIEW

- What?!
- How this came about
- Project Scope
- Who worked on it

- How we worked on it
- What we achieved
- What we learned
- Future

WHAT?!

- Video log – an FDOT application for viewing on-system roadways.
  - Google search: 'Florida video log'
- An invaluable resource for safety and an untapped potential for classification, identification, and recognition of image features.

MyFlorida.com

Video Log Viewer Application

Help

Roadway ID	Direction	Mile Point
55050000	North	0.000

Search | Click this button to find Video Log for info above

Roadway Name	Frame Date	Frame Number
US-27/US-319/SR-61/THOMASVILLE RD	11/02/2015	5

Frame Backward | Play Backward | Stop | Play Forward | Frame Forward

Play Speed: ○ 1 fps ◉ 2 fps ○ 3 fps ○ 4 fps

Message: Lead-in/Lead-out

HOW THIS CAME ABOUT

- I ran into Carey Shepherd at FDOT and said it would be cool to identify ADA features from video log images.
- Carey said yes. We can get funding to do a project.
- I received documents about how to apply and the project was born.
- We were awarded a T2 funded project with a $9,000 cap.

PROJECT SCOPE

- This is a feasibility and proof of concept study to use image processing techniques to automatically detect the following features from video log:
  - Curb ramps
  - Sidewalks
  - Detectible warnings
  - Pedestrian push buttons

PROJECT SCOPE

- The project contains two tasks:
  - Task One – conduct research of image processing techniques that can be applied
  - Task Two – develop classification algorithms that can identify ADA features in images

PROJECT SCOPE

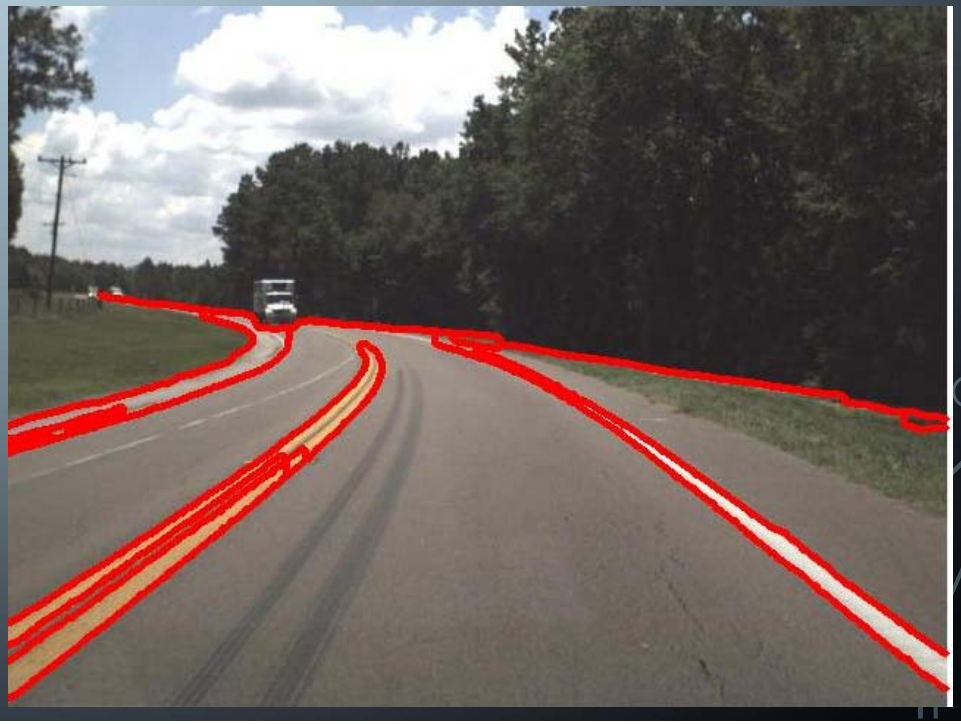
- We are working together to develop image processing techniques and algorithms to automatically identify which ADA features are contained in any given video log image.
- Though there are only 4 features to identify now, we hope to continue efforts in more research to expand the classification reach.

WHO WORKED ON IT

- UF Professors from the UF Transportation Institute
  - Dr. Sanjay Ranka – principal investigator
  - Dr. Anand Rangarajan – co-principal investigator
  - Dr. Sivaramakrishnan (Siva) Srinivasan – co-principal investigator
- FDOT
  - Dean Perkins
  - Chris Talbot
- Immediate excitement when we started the project.
- Great enthusiasm and direction for accomplishing the tasks.

HOW WE WORKED ON IT

- Preliminary results using the Hough transform method



HOW WE WORKED ON IT

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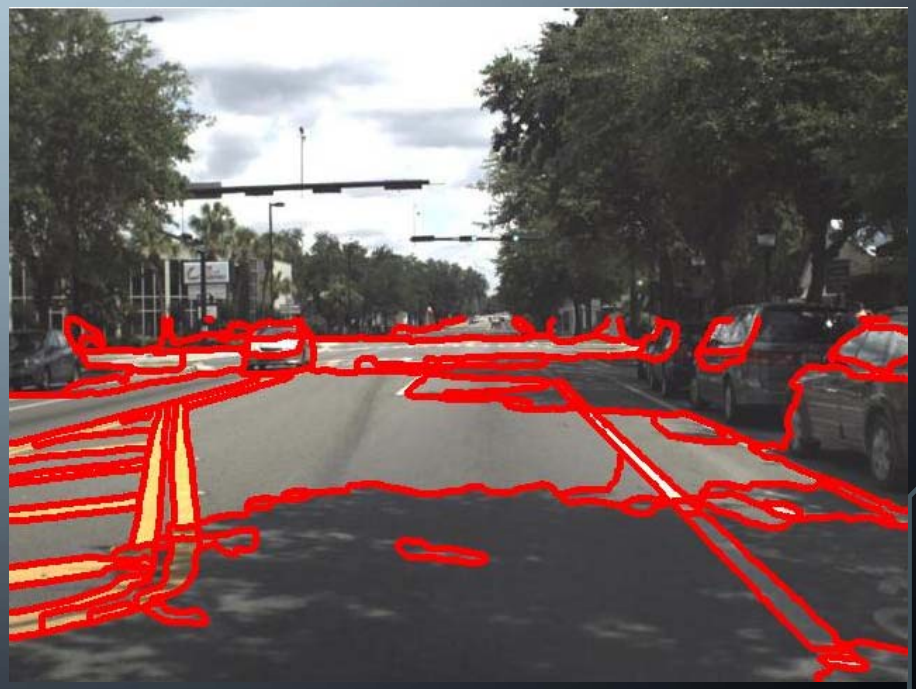


HOW WE WORKED ON IT

- Early results led to the need for building a learning network and a bit more research.
- The next step was to use a convolution neural network (CNN)
  - A CNN mimics human brain. It actually sees an image as we do, where we can identify patterns, objects, colors, and different elements contained in the image, so can the CNN
- However, our CNN first had to learn what to look for. It needed training images that identified ADA features.

HOW WE WORKED ON IT

Intent is to capture the existence of a pedestrian signal and the height from ground to the push-button.

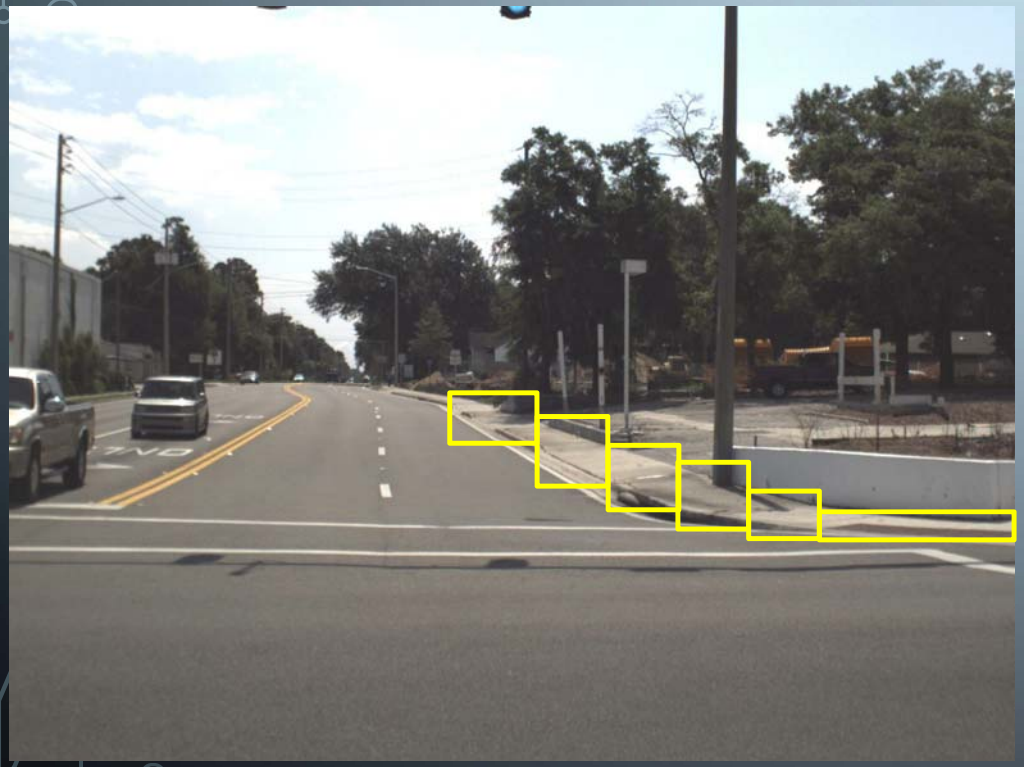
HOW WE WORKED ON IT

Intent is to capture the warning area.

HOW WE WORKED ON IT

Intent is to capture the slope.

HOW WE WORKED ON IT



Intent is to capture the walkable area for pedestrians.

HOW WE WORKED ON IT

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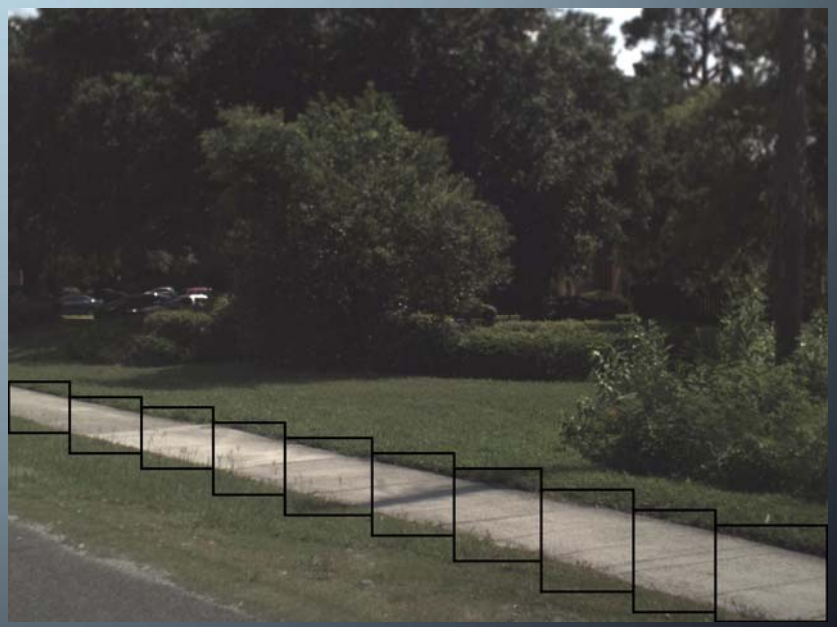
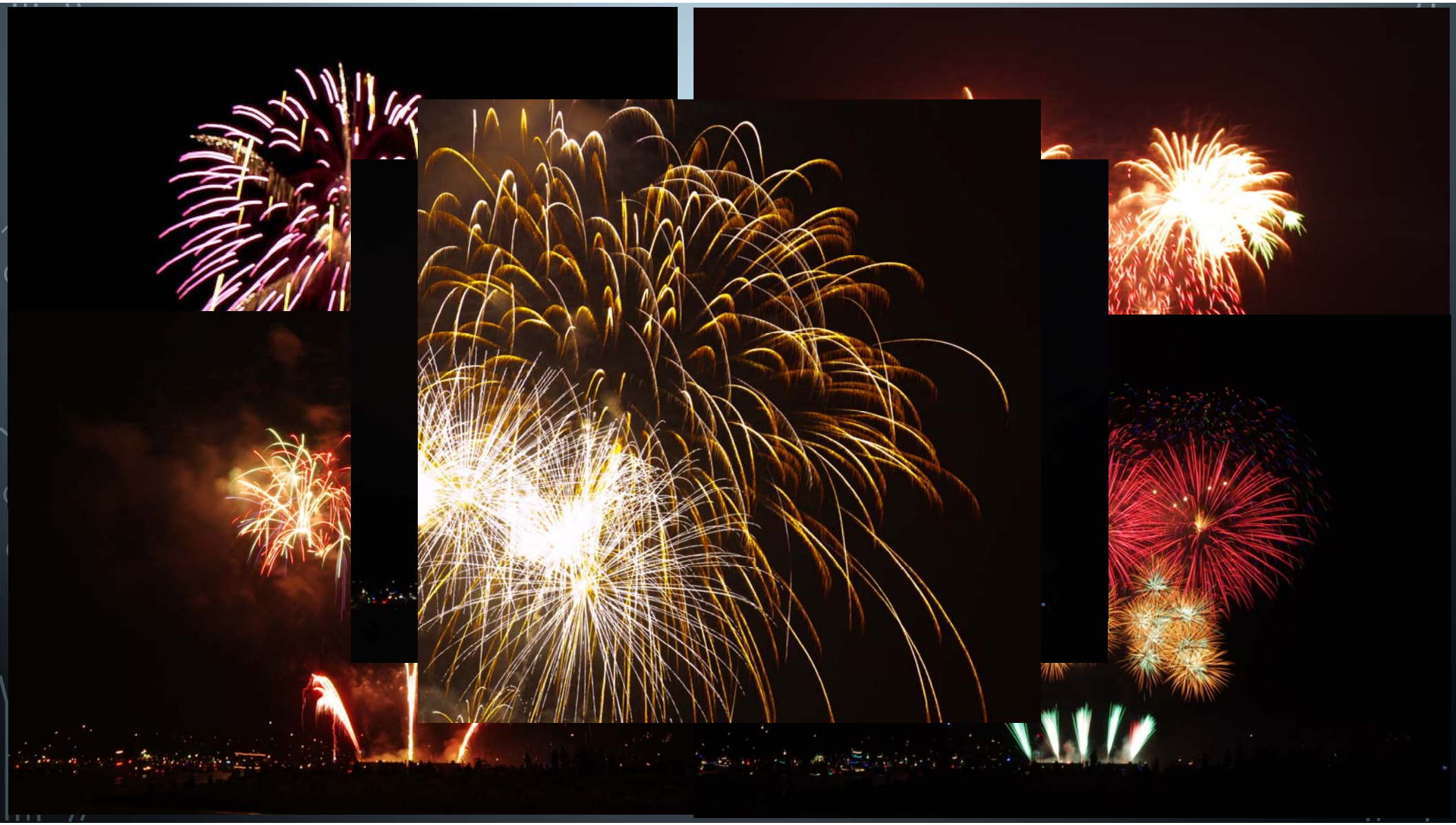
<roadway>B26010000N</roadway>
<layout>
      <image>I_02343</image>
      <part>
            <class>button</class>
            <bndbox>
                  <xmin>150</xmin>
                  <ymin>400</ymin>
                  <xmax>220</xmax>
                  <ymax>670</ymax>
            </bndbox>
      </part>
      <part>
            <class>warning</class>
            <bndbox>
                  <xmin>0</xmin>
                  <ymin>660</ymin>
                  <xmax>50</xmax>
                  <ymax>670</ymax>
            </bndbox>
      </part>
      <part>
            <class>sidewalk</class>
            <bndbox>
                  <xmin>50</xmin>
```

HOW WE WORKED ON IT





WHAT WE ACHIEVED

- We developed a CNN that SUCCESSFULLY identifies ADA features!!
- The CNN most effectively identified push buttons and sidewalks.
- The warnings and curb ramps were too varied and didn't have enough training images.

WHAT WE LEARNED

- Growing Pains:
  - There were not enough training images
  - At least 50 images per feature will be needed to fully implement a system
  - Need more funding

FUTURE

- Obtain more funding to further the research.
- Eliminate manual feature extraction.
- Validate this project by proving its impact on future collection techniques.
- Identify more features:
  - Street signs
  - Traffic signals
  - Railroad crossings
  - Pavement markings
  - Median types

QUESTIONS?