Automated Video Annotation for Traffic Incident Managers Software System

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Problem Area

This project seeks to automatically identify what Traffic Incident Managers(TIMs) are doing with their computers based solely on video screen capture.

- TIMs detect, respond and clear traffic incidents
- We automated behavioral data collection
- Solutions needed to address their convoluted current system

Methods

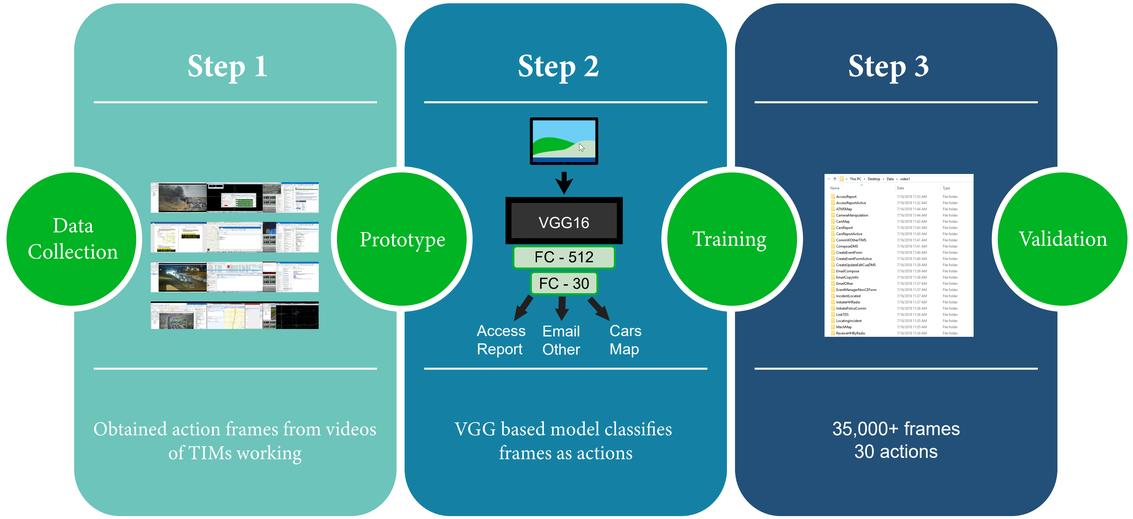
- Created a python script to convert video data from [3] into PNG images using FFmpeg
- Sampled 30 frames around human annotation of behavior as positive instances
- Built model with a pretrained VGG16 base using our own classifier
- Trained on our frames of data using Categorical Entropy loss and RMSProp optimization

Results

- Top-1 Accuracy: 8.7%
- Random Guessing: 3.4%
- Single frame benchmark: 38.1% [1]
- State of the Art: 71.8% [2]
- Better models might yield better results
- Reason to doubt the usefulness of our dataset

Overview

We performed an exploratory study for automating annotation of behaviors in screen captured videos. We developed a model with a VGG16 core that classifies a frame of video as indicating 1 of 30 observed behaviors. Our dataset consists of frames extracted from annotated videos of Traffic Incident Manager (TIM) videos.



Future Work

- More models:
  - Two-Stream networks
  - High-Res - Low-Res network
  - Shallow models
- Model TIM workflow
- Predict TIM errors
- Longitudinal behavior studies
- Model transferability tests
- Detect Mouse Cursor

[1] Karpathy, A., Toderici, G., Shetty, S., Leung, T., Sukthankar, R., & Li, F. F. (2014). Large-scale video classification with convolutional neural networks. Proceedings of the IEEE Computer Society Conference.
[2] Pandit, N., & Abdelhak, S. (2017). Evolution of Trajectories: A Novel Representation for Deep Action Recognition. Proceedings of the on Thematic Workshops of ACM Multimedia 2017, 402–407. https://doi.org/10.1145/3126686.3126775
[3] Monaghan, Q., Walton, J., Gilbert, S., & Sharma, A. (2018). The Software-Based Challenges Faced by Traffic Incident Managers. Transportation Research Board 97th Annual Meeting,

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