NDS Tool Development
FHWA Support of SHRP 2 Safety Implementation

Presented at the
9th Safety Research Symposium
Second Strategic Highway Research Program
Transportation Research Board
July 10, 2014

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FHWA Support of Implementation

1. Expand and support user community –
   • Safety Training and Analysis Center (STAC)
     • Provide training
     • Assist states and other researchers

2. Research funding – Implementation Assistance Program

3. Tools – Exploratory Advanced Research
   • Better access to data.
   • Simplify privacy protections
• Bridge between basic and applied research.
• Funds longer term, higher risk breakthrough research
• Projects with potential for transformational improvements to transportation systems.
Technical Challenges:

• Large, complex data sets (NDS -- 2 petabytes)
• Difficult video conditions, e.g. constantly varying shadows
• NDS video comparatively grainy, low-res, compression artifacts
Automated Data Extraction from Images

- Human beings can easily identify the sign in all three situations.
- Machines can’t.
Three project objectives --

• Automated video coding/data extraction

• Automated identity masking

• Calibration and evaluation of automated algorithms
Initial BAA

  - Expected completion – 9/2014
- Funding: $998,000  PI: -- Brett Browning
- Title: “Machine Learning for Automated Analysis of Large Volumes of Highway Video”
  - Focus – outside the vehicle
  - Objective -- Robust, flexible algorithm; tolerant of shadows, variance in object orientation, etc.
Inter-Agency Agreement

• Award: Oak Ridge National Laboratory, 6/28/2013
  – Funding: $1,166,000      PI: Tom Karnowski
  – Title: Computer Vision Measurements and Analysis to Support Naturalistic Driving Study

• Key tasks
  – After-the-fact camera calibration
  – Develop metrics, procedures and standard data sets to measure effectiveness of automated algorithms
New EAR Broad Agency Announcement -- BAA DTFH61-13-R-00011 following on earlier work

**Topic 2A: Automated Feature Extraction (3 awards)**

Focus entirely within the vehicle – head pose, gesture, mouth and eye motion, phone use, etc.

**Topic 2B: Automated Identity Masking (2 awards)**

Automatically mask identify while still allowing researchers to determine head pose, expression, etc.
• Award: SRI International – 3/13/2014
  – Completion: 3/12/2016
  – Funding: $598,000    PI: Amir Tamrakar
  – Title: DCode: A Comprehensive Automatic Coding System for Driver Behavior Analysis

• Award: Carnegie Mellon University – 3/13/2014
  – Completion: 3/12/2016
  – Funding: $600,000    PI: Marios Savvides
  – Title: DB-SAM: CMU Driver Behavioral Situational Awareness System
• Award: Univ. of Wisconsin – Madison – 4/10/2014
  – Completion: 4/10/2015
  – Funding: $600,000       PI: John Lee
  – Title: Quantifying Driver Distraction and Engagement
EAR: Topic 2B Awards

• Award: Carnegie Mellon University – 4/17/2014
  – Completion: 4/30/2015
  – Funding: $314,000   PI: Fernando De la Torre
  – Title: Video De-identification in the Automobile Environment

• Award: SRI International – 2/12/2014
  – Completion: 2/15/2015
  – Funding: $399,000   PI: Gregory Ho
  – Title: Dmask: A Reliable Identity Masking System for Driver Safety Video Data
• FHWA committed to the development of tools to make it easier for a wide range of researchers to access and utilize the SHRP 2 Safety data sets.
• Exploratory Advanced Research – We will continue to look for research gaps which may be addressed by new or follow-on research projects.
Thank You

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