Managing drowsy driving risk using information-rich data from fatigue detection systems

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Overview

- Introduction to drowsiness data
- Data collection
- Results
  - Circadian patterns
  - Longer-term trends
  - Shift effects
  - Geolocation correlations
Introduction

• Many different types of devices and appliances are now generating data

• A new type of data is available having arisen from the development of fatigue detection systems

• Optalert systems continuously monitor the driver using an objective measure of drowsiness

• How can this data be used?
Optalert’s drowsiness scale is called the Johns Drowsiness Scale (JDS)

• The JDS uses a weighted combination of variables derived from blinks

• The “Alert” range on this scale is 0 – 4.4

• Scores from 4.5-4.9 indicates moderate levels of drowsiness

• Scores above 5.0 are considered to indicate increasing levels of drowsiness and therefore increased risk of performance failure
Data collection – for this study

Data Server

Drowsiness level
Location
Time
Circadian effects

• Well-known physiological changes

• Corresponding with these changes, we would expect:
  
  • Higher average JDS scores during night time
  
  • Higher frequency of Medium & High Risk Warnings during night time
  
  • These patterns to be repeated across geographies
Results – circadian effects

Mine site in Africa

Data collected from 467 drivers and 95 vehicles during day, night and afternoon shifts between 1st July 2015 – 30th June 2016 (12 months)
Blue shaded periods graph represent Nightshift
Results – circadian effects

Mine site in Chile

Data collected from 221 drivers (47 vehicles) during day shifts and night shifts between 1st May 2015 – 30th September 2015 (5 months)

Blue shaded periods graph represent Nightshift
Results – circadian effects

Mine site in Brazil

Data collected from over 400 drivers and 90 vehicles during day, night and afternoon shifts between 1st July 2015 – 30th June 2016 (12months)
Looking at data over longer periods of time can reveal underlying trends
Results – shift day vs night

- Consistently higher average JDS scores for Night shift
Results – time on shift

- Increase in drowsiness towards the end of shift rotations

Average JDS per day of shift

Frequency of Warning per day of shift
Results - geolocation

- All drivers, all days of year
Results - geolocation

• Drill-down to identify riskier days of the year
Results – geolocation

- Majority of warnings given to 4 drivers over 5 days of the year
  (12\textsuperscript{th} March, 10\textsuperscript{th} Aug, 26\textsuperscript{th} Aug, 15\textsuperscript{th} Dec, 27\textsuperscript{th} Dec)

Warnings for all drivers over year

4 drivers, 5 days of the year
Results – geolocation
Conclusions

The combination and correlation of scaled drowsiness data with other measures results in rich data sets that can be used to:

- Identify fatigue risk
- Inform decision-making
- Measure efficacy of operational change
- Influence safety and regulation
Questions

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List of publications


