Road Mishap Risk Assessment

Instructor: Prof. Ralph Lano
Subject: Recent Trends and Technologies

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Literature Review

1. **Specialist search engines that we are using**:
    - https://academic.microsoft.com/home
    - https://worldwidescience.org/
    - https://www.base-search.net/
    - http://scholar.google.com/

2. **How big our field is:** More than 10000+ publications which includes Journals, Patents, Conferences, Books, Thesis Papers etc.
    I. Key Players who are currently working on addressing the issue:
        - BMW
        - AUDI
        - TRL (Transport Research Laboratory, UK)
        - TNO (Netherlands Organization for Applied Scientific Research)
        - ITF (International Transport Forum)
        - FERSI (The Forum of European Road Safety Research Institutes)
        - TRIMIS (Transport Research and Innovation Monitoring and Information S/M)
        - Google
        - Uber
        - Ford Motors
        - Daimler AG
        - ECTRI (European Conference of Transport Research Institutes)

    II. Conferences/Publications:
        - Journal of Safety Research (Journal)
        - Injury-international Journal of The Care of The Injured (Journal)
        - IEEE International Systems Conference (SysCon) (Conference)
        - Accident analysis and Prevention (Journal)
        - National Conference on Artificial Intelligence (Conference)

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3. **Six of the Important Articles**:
   A. Study on good practices for reducing road safety risks caused by road user distractions
   B. Application of Machine Learning Algorithms for Visibility Classification
   C. BMW Innovation Lab for AI in Automotive Industry
   D. Book- Climate as a factor in planning and deciding new roads and motorways
   E. The Relationship Between Road Accident Severity and Recorded Weather
   F. Mining Road Traffic Accident Data to Improve Safety: Role of Road-Related Factors on Accident Severity in Ethiopia.

A. Summary: Study on good practices for reducing road safety risks caused by road user distractions:

During the time spent recognizing the real mishap chance we ran over a few variables which are genuine most influenced reasons for mishap in that one of the references we discovered is about Driver Distraction re-search completed by European Commission, DG MOVE which was basically distinguished that Driver Distraction is a most influenced factor for the majority of the mishaps in Europe. This venture analyzed the nature and size of the driver distraction in road safety in the EU (particularly as far as cell phones), and those countermeasures which can be utilized to bring down its effect. A writing audit, a survey of factual distributions on national street injury information, a partner study, meetings and workshops, a survey of innovation improvements and a multi-model's examination were embraced. The examination inferred that 10-30% of road mishaps in the EU could have interruption as a contributory factor, despite the fact that confinements of the information accessible mean this figure requires further approval. An enormous number of innovation advancements were recognized that get the opportunity to affect on the issue, both as far as hidden advances in future cell phones, and regarding vehicle security frameworks. Nine proposals are given, regarding information prerequisites, innovation, mindfulness and training, and gauges; these suggestions depended on the multi-standards examination of expenses and advantages.

In this study, TRL, TNO and Rapp Trans undertook a number of tasks to answer the following research questions:

- What is the nature and size of the distraction problem in road safety in the EU?

- Which approaches and countermeasures have been used to reduce the road injury burden of distraction?
- Which 'best practice' approaches should be used by EU states in their efforts to reduce the road injury burden of distraction (including an assessment of costs and benefits)?

This research study finally concluded based on the statistical data from different EU countries proposed that many technological developments like collision warning systems, Speech based infotainment systems, Night vision and aware programs like public campaigns, Pedestrian distraction study, Good driving behavior etc. By the above-mentioned solutions road mishap can be reduces to significant numbers.

B. Summary: Application of Machine Learning Algorithms for Visibility Classification

This reference has specifically concentrated on Florida, USA because Florida ranked third in the number of accidents due to low visibility between 2002 and 2009, with 299 fatalities, a number higher than the amount of deaths caused by hurricanes and lighting combined. Low perceivability conditions began by the nearness of mist and smoke can truly prompt antagonistic situations on streets, causing mishaps, and endangering the activity, execution, and security of transportation frameworks. In the course of recent years, diminished perceivability has been the explanation of serious crashes across the country.

Some of the challenges related to visibility systems are:

• Traditional visibility systems are expensive and typically limited to only few locations.
• It is impractical to have visibility sensors covering all possible fog locations.
• Fog is a weather variable difficult to forecast due to its ambiguity, complexity, and vagueness.

Due to the complexity of weather variables, classification and forecasting techniques for low visibility scenarios remain a challenge and a matter of interest and concern for transportation agencies nationwide. This paper provides an exploratory study of the use of non-linear algorithms for visibility classification using data from Automated Weather Observation System (AWOS) and Automated Surface Observing System(ASOS) stations. The classification task is setup as a multiclass problem, where visibility ranges are the classes. From the results, the ANN model was able to achieve the highest accuracy score (89.71%) among the algorithms implemented.

C. Summary: BMW Innovation Lab for AI in Automotive Industry

While investigating the new AI improvements going on the Automotive business we ran over this intriguing article about BMW Innovation Lab late development in the space of AI which is a blend of Machine Learning and Computer vision, Computer become fit for performing visual assignments that once must be finished by human, making vehicle creation more efficient for BMW. The automaker is right now utilizing some of these man-made reasoning (AI) applications prepared calculations to perceive pictures through a camera framework during production. Picture acknowledgment is one of the most widely recognized assignments in the field of computer vision and a lot of it depends on profound learning. Picture acknowledgment is the capacity to recognize questions in pictures. It utilizes machine vision innovations with man-made consciousness and prepared calculations to recognize pictures by means of a camera framework.

- These algorithms are available now at github.com/BMW-InnovationLab.

The calculations are a piece of different AI applications utilized by BMW, and spotlight essentially on robotized picture acknowledgment and picture labeling. Making these calculations openly accessible permits programming engineers anyplace on the planet to see, change, utilize and enhance them. Neural Networks are utilized to contrast live pictures underway and picture databases to identify any deviations from the objective. This once tedious undertaking is currently performed by a camera and self-learning programming that contrasts the camera's live pictures and several put away pictures in just milliseconds. The intension of BMW automaker in keeping this open source is welcome the new developments based on existing algorithms and any flaws found can be rectified by the open source contributors.

D. Summary: Book- Climate as a factor in planning and deciding new roads and motorways

To keep away from the Road mishaps, Road conditions ought to be acceptable and roads ought to be structured so that it tends to be adoptable to all the climate conditions. During the time spent our writing search we centered this factor and distinguished that there a broad report accessible from UK government about road planning in various climate conditions and advising the meteorological forecast to drivers regarding a specific area and so forth. This reference probably incorporate road planning and improvement yet our advantage just to concentrate on road security estimates dependent on climate condition.

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The climate impacts the security of road users in two different ways. It influences the volume of traffic out and about (especially private vehicles), and it might decrease the quantity of users presented to the possible danger of climate prompted mishaps emerging from dangerous roads, poor perceivability, solid breezes, day off ice. When looking at various courses for a specific new road conspire, those courses presented to the most noticeably terrible of the nearby climatic conditions might be relied upon to take noteworthy less traffic than the others, and besides the mishap rate on these courses might be unacceptably higher than on the others. Ice and snow on the interstate decrease grinding between the tire and the street surface. In zones where these wonders are visit and diligent the issue is regularly overwhelmed by a mix of activity by the street client (for example fitting extraordinary snow tires), and preventive measures by the thruway specialists (for example clearing day off getting streets forestall ice arrangement). It is in zones where the perils are discontinuous or periodic that the effect on traffic development is regularly most prominent. So this study concludes that to avoid the road accidents not only driver safety precautions are required it also required the good roads which supports for all kind of weather condition, to build such roads proper planning is required.

E. Summary: The Relationship Between Road Accident Severity and Recorded Weather

In order to understand the legacy solutions, that are addressing the road accidents we researched between 1990 to 1999, those study researches mostly correlate with weather conditions. This paper investigates the relationship between weather and road accidents in England and Wales. The weather information recorded on Police Accident Report Forms was taken as the prevailing weather at the time of the accident. At the local authority level, accident severity for the various adverse weather categories of rain, fog, and high winds is compared with the nonhazardous condition of fine weather. Severity ratios are then calculated. Findings establish that accident severity decreases significantly in rain compared with fine weather, while severity in fog shows geographical variation. This research concluded the road accident reasons correlates based on weather condition and it is divided in to 2 categories as Hazardous (Rainy) and Non-Hazardous (Fog) based on the recorded weather data of all accidents segregated based on categories. In the future, modification of driver behavior during adverse weather will be a key factor in risk reduction.

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F. Summary: Mining Road Traffic Accident Data to Improve Safety: Role of Road-Related Factors on Accident Severity in Ethiopia

Different examinations have tended to the various parts of Road Traffic Accidents (RTAs), with most concentrating on foreseeing or setting up the basic components affecting injury seriousness. Various information mining-related examinations have been embraced to dissect RTA information locally and all around, with results habitually fluctuating relying upon the financial conditions and foundation of a given area. In this research study most of the experimental results used the data mining tool as WEKA and experimented the different kind of algorithms and recorded the Number of accurate classifications and Accuracy scores. A careful writing audit uncovered a hole in distributed examinations on the connection between street attributes and RTA seriousness in Ethiopia. In this paper, a cleaned car crash information endeavored to build novel traits and tried various prescient models. The yields of the models were introduced for investigation to area specialists for criticism. The RTA is anxious to proceed with the examination to recognize territories of intrigue that ought to be given assets for traffic well-being. At long last, information was introduced as rules utilizing the PART calculation of WEKA.

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