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TruePace AI

1. Introduction

Reckless driving is a growing problem with 53.6% of car accidents in 2023 being caused by reckless driving. Current efforts to eliminate reckless driving often fall short. While law enforcement is helpful, they cannot maintain a constant presence on every road, and traffic cameras often punish speeding rather than preventing it. Despite the authorities best efforts, drivers can still predict when and where speed checks will be. The core issue is a lack of real time insight on traffic behaviors and emerging high-risk areas, leaving both authorities and individual drivers with insufficient data to proactively address the problem. Unlike traditional approaches, TruePace AI offers a proactive and predictive layer of insight, empowering both authorities and individuals to make informed decisions before an incident occurs. TruePace AI will use traffic cameras to track traffic patterns and high-risk areas, giving anyone the ability to see real time and predicted data of the roads around them.

2. Background

2.1 Reckless driving

Out of the 60,048 accidents that happened in 2022, 11,103 of them were caused by speeding, 9,594 of them were caused by driving under the influence, and 3,124 of them were caused by distracted drivers. Just from 2022 to 2023 the amount of accidents caused by speeding went up by 5%, totaling 11,775 accidents.

Reckless driving has severe impacts that extend beyond immediate accidents and fatalities. Economically, for example, it leads to increased insurance premiums for all drivers. From 2022 to 2023 the average insurance rate increased 5% regardless of the driver's record. Then consider property damage for both vehicles and infrastructure. From 2022-2023 the number of police-reported property-damage-only crashes increased by 4.2%, resulting in $176,776 more in damages.

Reckless driving is taking up an increasing amount of law enforcement resources. For example, the estimated number of police-reported traffic crashes increased from 5.93 million in 2022 to 6.14 million in 2023, a number that continues to rise with reckless driving incidents. This significant number of responses consumes valuable resources that could otherwise be used for other emergencies.

Public perception of reckless driving is also evolving with time. There is a growing awareness of its dangers and social media is playing a significant role in shaping public perception. While it can be a great platform for raising awareness and sharing news about accidents, it can also glorify risky driving behaviors. New trends and challenges promoting high speeds or dangerous stunts can influence younger demographics, and normalizing actions that put themselves and others in danger. This shift in public opinion is leading to a greater demand for effective solutions and stricter enforcement.

2.2 Traffic Patterns

2.2.1 Drivers

Traffic patterns greatly influence driver behavior, their commute times, fuel consumption, and even mental state are affected. In a report from the Texas A&M Transportation Institute, researchers found the average American driver wastes 54 hours a year in traffic delays.

Predictable patterns such as rush hour can lead to longer travel times and increased idling, burning more fuel and causing increased aggravation. While some drivers can predict the busiest of roads, they still run into unpredictable traffic patterns. For example, accidents or unexpected road closures can cause minor to severe delays, forcing drivers to find alternative routes which adds to their frustration and may lead to unsafe maneuvers. However, areas with sporadic traffic can increase the chances of accidents due to frequent braking, lane changes, and driver impatience.

2.2.2 Growth

Traffic patterns can also significantly impact companies and cities looking to expand by influencing logistics, infrastructure costs, and overall accessibility. For companies, expanding into areas with heavy or unpredictable traffic can lead to increased shipping times, higher fuel consumption, and greater operation costs. Traffic can also affect employee commutes, interfering with employee behavior and workplace performance. However they can positively affect companies as well, especially when it comes to customer foot traffic or advertisement placement.

For cities, growth in population and businesses often exaggerate existing traffic issues, leading to increased delays. This makes the need for significant investment in infrastructure projects like road widening, new public transportation systems, and improved traffic management technologies. These projects are time and cost effective, impacting budgets and potentially delaying economic development. Unmanaged traffic growth can negatively affect the quality of life for residents and tourists, possibly leading to increased pollution, noise, and decreased pedestrian safety with; in turn deteriorating further growth and investment. Understanding and proactively managing traffic patterns are crucial for the financial growth of both businesses and cities.

3. TruePace AI

3.1 Function

3.1.1 Overview

TruePace AI is a software that will use city traffic cameras to track traffic patterns, reckless driving, and average speed of each road. The TruePace app will display a real time data map where users can access average speeds, areas with frequent reckless driving, historical traffic data, where accidents are likely to happen, and the predicted speed/usage of any road for any given time. TruePace AI can also notify users of emerging hazards such as sudden slowdowns and excessive reckless driving, alongside any other incidents reported by its users. It will also help drivers make informed decisions about routes based on the congestion of each road and likelihood of another accident happening.

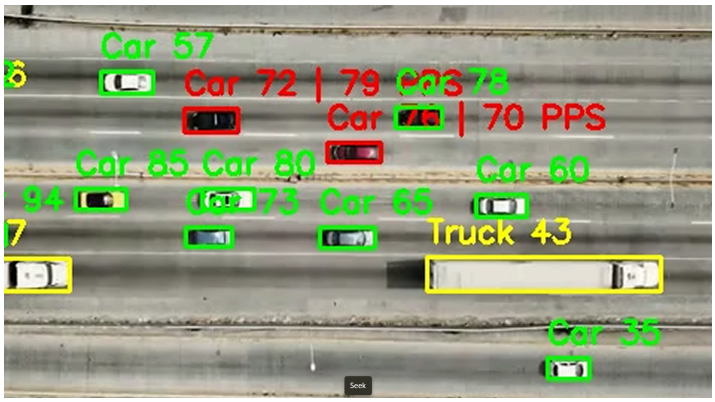
3.1.2 Hardware

For hardware, TruePace will use preexisting traffic cameras with available live streams and plug it into the software. Since each traffic camera is at a different angle and position we will have to set a custom geometric setting for each camera in the software to have a uniform system.

3.1.3 Software

The True pace software is the majority of the product. Using a custom AI trained on a large data set TruePace will use each frame to distinguish any vehicles. By giving each vehicle a specific ID number, the AI can both count the vehicles and find their displacement from frame to frame. Using that data it can track the speed of each vehicle to find both the average speed of the roads and which vehicles are speeding. TruePace can also detect when cars are swerving by measuring how much horizontal data the model is giving. Using this data and the proximity of

vehicles from one another we can find both when a vehicle is cutting another off and when tailgating is occurring. We can also identify potential road hazards such as stalled vehicles, by analyzing changes in vehicle movement and patterns. The software can tell the difference between different types of vehicles, enabling more diverse data collection on traffic flow and specific vehicle behaviors. [Functional Demo Here](#).



3.2 Applications

3.2.1 Drivers

Drivers would be able to use TruePace to enhance their daily commute and overall safety on the roads. By using our software, drivers can access real-time data for traffic patterns, average road speeds, and areas with frequent reckless driving. This allows them to choose routes that avoid congestion, high-risk zones, and reported incidents, reducing travel time and the likelihood of encountering any dangerous situations. The app's predictive capabilities can also warn drivers of any potential hazards such as sudden slowdowns, street racing, or future congestion, giving them plenty of time to react and adjust their route. By making informed decisions based on the TruePace AI data, drivers can find faster, more efficient routes and avoid any reckless driving, leading to a safer driving environment for everyone on the roads.

3.2.2 Law Enforcement

Law enforcement will benefit from TruePace by being able to significantly improve both traffic safety and management. Our system provides real-time insights into high-risk locations,

allowing for targeted deployments. Instead of relying on reactive measures, authorities can address emerging issues like increases in reckless driving or unexpected congestion before they happen. This predictive capability helps in optimizing patrol routes, deploying officers to critical areas before accidents happen, and managing traffic flow more effectively during peak hours and special events.

3.2.3 Government

Governments can use TruePace for planning infrastructure and development. Our system's real-time and predictive data on traffic patterns, congestion, and accident hotspots provides valuable data for urban planning. This allows governments to identify areas requiring road improvement, public transportation enhancements, or traffic management upgrades. By understanding future traffic demands and problematic zones, cities can prioritize investments in infrastructure, ensuring efficient resource allocation and sustainable urban growth. TruePace AI can also help in designing safer road layouts and implementing intelligent transportation systems, ultimately improving overall traffic flow and reducing accidents across cities and regions.

3.2.4 Companies

Companies can benefit from TruePace with data to optimize their logistics, enhance fleet management, and ensure the safety of their employees. With our traffic data, businesses can plan more efficient delivery routes, reducing fuel costs and delivery times. The system's ability to identify high-risk areas and provide alerts for emerging hazards allows companies to proactively adjust routes, minimizing exposure to potential accidents and ensuring the timely arrival of goods and services.

When considering location planning for businesses such as gas stations or fast food restaurants, understanding foot traffic and vehicle movement is important. TruePace can provide valuable data by analyzing real-time and past patterns, identifying areas with both high vehicle density and frequent stops. For gas stations, this means pinpointing spots with consistent vehicle flow, especially during peak travel times. For restaurants, our system can highlight pedestrian-heavy zones or areas with slow-moving traffic that allows for easy access and visibility. By using TruePace's predictive capabilities, businesses can predict future demand and congestion, ensuring they select locations that maximize customer accessibility and operational efficiency, ultimately leading to increased revenue and growth.

4. Current Market

4.1 Acusensus

Acusensus is a company dedicated to improving road safety by developing Artificial intelligence based solutions to reduce distracted driving. Their company has pioneered several technologies, including the first camera program to detect when drivers are using their phone, or not utilizing their car's seatbelts. They can also identify speeding, tailgating, swerving, and unregistered vehicles in addition to illegal phone use. They partner with governments and businesses in order to decrease road dangers.

4.2 Milesight

The Milesight AI Road Traffic Speed Dome Camera is a surveillance camera designed for advanced traffic management. It uses an AI-driven camera to focus on human and vehicle detection, with key features like real-time License Plate Recognition and the detection of various traffic violations. While also having the capability to detect traffic flow and patterns to further

enhance traffic management capabilities. Milesight can also seamlessly connect to any existing cameras as well as having their own models.

5. Comparison

5.1 Features

TruePace, Acusensus, and Milesight AI Road Traffic Speed Dome Camera all offer solutions for traffic management and road safety, but they all have different purposes and features. TruePace focuses on proactive traffic insight, providing real-time and predictive data to prevent reckless driving. It analyzes traffic patterns, average speeds, reckless driving areas, to predict accidents, future road usage and congestion. True pace can detect the speed of cars, swerving, tailgating, stalled vehicles, and various vehicle types, while offering alerts for emerging hazards. TruePace AI is accessible to anyone while some data will be specific to private companies or governments. Our goal is to have data accessible to help people be safer on the roads.

In contrast, Acusensus aims to improve road safety by detecting distracted driving and other traffic violations. Its main points are distracted driving, speeding, tailgating, and swerving. While it detects these violations, it is not stated to provide real-time alerts for drivers, focusing instead on enforcement for governments and businesses. Unlike TruePace AI and Milesight, Acusensus does not offer predictive functionalities.

Milesight is designed for advanced traffic management and surveillance. It utilizes human and vehicle detection, License Plate Recognition , and identifies traffic violations. in addition to analyzing traffic flow and patterns. Its primary users are traffic management

authorities and surveillance operators and do not have open data for drivers. Like Truepace it does also have predictive capabilities related to traffic flow and patterns.

6. Conclusion

TruePace addresses the escalating problem of reckless driving and traffic accidents through our software. Our system integrates with existing traffic cameras, transforming passive surveillance into a powerful tool for real-time and predicted data. This allows us to provide data on current road conditions, average vehicle speeds across various sections, and precisely identify high-risk areas prone to accidents or congestion.

This unique, data-driven approach offers benefits across multiple fields. For drivers, it gives valuable insights that can help them avoid dangerous routes and optimize travel times. For law enforcement, TruePace provides crucial predictive data that enables the strategic deployment of resources to prevent incidents rather than react to them. Governments can use our data to make informed decisions regarding urban planning, infrastructure improvements, and traffic management policies, creating sustainable development. Businesses can use TruePace's detailed traffic insights to optimize logistics, enhance fleet management, and select optimal locations for new establishments.

A key difference of TruePace, when compared to current markets such as Acusensus, which primarily focuses on enforcement, or Milesight, which offers a broader range of surveillance hardware, is its singular focus on prevention through widely accessible data. We aim to fundamentally shift the standard from reactive enforcement to proactive action. By allowing everyone to access intelligent traffic data, TruePace is committed to creating a measurably safer, more efficient, and more predictable driving environment for all road users.

7. Sources

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