Data is the Key to Improving Pedestrian Safety

Drivers in the United States struck and killed an estimated 7,485 pedestrians – the most in a single year in four decades and an average of 20 deaths every day, according to an estimate released by the Governors Highway Safety Association (GHSA). To provide additional context on pedestrian safety trends, the report also includes an analysis of 2020 data from the National Highway Traffic Safety Administration (NHTSA) that reveals a shocking new statistic – the percentage of speeding-related pedestrian crashes involving children ages 15 and younger more than doubled in the previous three years.

Since 2016, dozens of US cities have adopted parts of a program called Vision Zero, a Swedish philosophy from the 1990s that envisions eliminating auto accidents and recommends preventing them through traffic engineering. The program (which is designed to cover all auto-related accidents on roadways, not just those involving pedestrians) recommends general tactics such as planning, organizational commitment, and accident evaluation. However, the Reason Foundation found that programs based solely on Vision Zero tactics have a mixed record of success.

It turns out that the devil is in the details – details that come only from capturing and analyzing data about pedestrian accidents as they happen and before they happen. It's only through such analysis that cities can understand the root causes of these accidents and take specific steps to reduce them. Most of these efforts have involved using pedestrian fatality data alone, but that doesn't explain the big picture, which should also include near-misses and what happens before the accident happens.

Building Smart Intersections

In the past few years, cities have begun building "smart intersections," where they deploy computer vision and Artificial Intelligence (AI) to capture, store and analyze traffic. Using pole-mounted video cameras linked over a network to analytical software, computer vision trains computers to process images and extract information similar to way our eyes work. Lest privacy advocates decry the use of video surveillance for this purpose, computer vision advocates point out that images are "anonymized" during process to eliminate pictures that reveal peoples' identities.

Computer vision-based traffic analysis helps cities identify specific traffic patterns and driver behaviors that increase the likelihood of accidents so they can make changes to alter those patterns and behaviors. Often, a computer vision system incorporates a related AI technology called Machine Learning (ML) that "remembers" previous traffic incidents, so the system becomes better at recognizing new events over time.

The key in all of this isn't the cameras – it's the AI-based analysis of the data from those cameras that reveals trends. For example, if a city knows there are a lot of illegal U-turns or wrong way driving in an area, it can do specific things to reduce that behavior.

In Las Vegas, there were a lot of accidents due to wrong way driving as cars left casinos on Las Vegas Boulevard. (Instead of making a right turn and going to the next light and making a U-turn, drivers were turning left against traffic, going across the median, and then then making another left to go the other way.) Once the city installed a computer vision system, it was able to recognize this pattern and then installed more signs at casino exits and marked entrances and exits to help prevent it.

In Hoboken, New Jersey, the city improved pedestrian safety by changing intersection designs to improve visibility, and now it hasn't had a traffic death in four years. In New York City across the river, such measures reduced traffic fatalities by 19% between 2010 and 2020.

St. Petersburg, Florida and many other US cities have also begun using computer vision technology to reduce traffic accidents. The St Petersburg program is still in its infancy, but city planners expect to expand the number of smart intersections to improve safety by studying traffic patterns.

Specific Remedies for Specific Areas

To reduce traffic fatalities most effectively, cities should begin with detailed analyses of their accident hot spots instead of trying to re-engineer every part of the road system. By focusing on these hot spots, they can make a big dent in pedestrian fatalities. Specific actions include:

- Adding buffer zones between bike lanes and traffic lanes, often narrowing or removing a travel lane in the process
- Deploying vertical bollards or high-visibility paint to better alert drivers about upcoming pedestrian crossings
- Closing travel lanes during peak hours
- Implementing pedestrian-only traffic signal phases that stop all vehicular traffic.

Traditionally, city planners have relied on general traffic studies that count cars or measure speed limits, but most city traffic studies are outdated. For example, traffic patterns today are much different than they were before or during the pandemic. Even recent studies are only snapshots of traffic at a specific time. Computer vision gives us the ability to analyze traffic continually in real time and to develop a knowledge of trends based on what's happening now. Smart intersections use computer vision for a specific purpose that saves lives.