A Vision-based Lane Detection Algorithm Incorporating Appearance-based Analysis and Salient Point Tracking

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Abstract:

In average 4 people get killed and 90 people get seriously injured every day on Australia’s roads, according to research conducted by Australian government. Due to this alarming numbers, Australia formally actuated its safe system strategy in 2011. The National Road Safety Strategy 2011-2020 have a powerful statement: “...we need the support of organisations, industry, businesses, community groups and individuals” and this statement became the prime motivation for this research.

This research is committed to eliminate injury and death on our urban roads through improving vehicles safety and road’s infrastructure. The reliability of the lane detection is a key component of supporting navigation in urban environment. Many approaches have been applied to solve the lane detection problem but most of them are not capable of dealing with abrupt light variations efficiently. The approaches that are currently robust still rely in expensive computational effort.

This method proposes a vision-based lane detection system that combines an appearance-based analysis with salient point tracking. It aims to increase the lane detection efficiency and accuracy by focusing on specific parts of the image using an intelligent algorithm. The preliminary experiments exposed a list of important facts to address. First, appearance-based analysis is capable of segmenting high contrast areas like lane marks. Second, system runtime can be reduced when specific Region-Of-Interest (ROI) are targeted instead of the analysing the whole image. Furthermore, a salient point tracker based on a mathematical representation of the road can effectively guide dynamic ROIs. Finally but none the less, independent dynamic ROIs can keep track of the lane marks, based in previous frames references, to accurately estimate the vehicle’s position according to the road. The preliminary work was introduced to the scientific community with the name GOLDIE (Geometric Overture for Lane Detection by Intersections Entirety).