Implementation of Lane Detection Algorithm for Self-Driving Car on Toll Road Cipularang using Python Language

1. Requirements: Computer Vision, Sensor Fusion, Deep Learning, Path Planning, Actuator System, Localization
   1. Computer Vision - How computers can be made for gaining high-level understanding from digital images or videos. Automate tasks that human visual system can do.
   2. Sensor Fusion - Combining of sensory data or data derived from disparate sources such that the resulting information has less uncertainty than would be possible when these sources were used individually. Uncertainty reduction, such as stereoscopic vision (calculation of depth information by combining two-dimensional images from two cameras at slightly different viewpoints).
   3. Deep Learning - Based on learning data representations, as opposed to task-specific algorithms.
   4. Path Planning - Lets robots find the shortest - or otherwise optimal - path between two points. Optimal paths could be paths that minimize the amount of turning, the amount of braking or whatever a specific application requires.
   5. Actuator System - Responsible for moving or controlling a mechanism or system.
   6. Localization - Robot’s ability to determine its own position in its frame of reference and then to plan a path towards some goal location. The robot or any other mobility device requires representation, i.e., a map of the environment and the ability to interpret that representation
2. Image Processing Method are a combination of methods of colour region, line selection, canny edge detection, and Hough transform.
3. This algorithm needs to add some method that can change the parameters during day and night adaptively because constant parameters can only be used in same lighting conditions.
4. Edge Detection. Step Detection. Change Detection. Feature Detection. Feature Extraction
5. Computer Vision Scopes: Lane Detection, Traffic Sign Detection, Vehicle Detection, Behaviour Detection
6. Steps for Lane Detection: Image Capture, Color Selection, Region Masking, Canny Edge, Hough Transform, Line Identified
7. The classical Hough transform was concerned with the identification of lines in the image, but later the Hough transform has been extended to identifying positions of arbitrary shapes, most commonly circles or ellipses.
8. Challenge: Lane Detection at night when image captured is too dark.