Abstract

The number of vehicles that exist today in Indonesia, according to data from the Central Statistics Agency (BPS) until the year 2013 as many as 104.118.969 and continues growth each year. This number counted so huge moreover not supported by the increasing road infrastructure. It occurs mainly in big cities that the majority are based in Java as an example of Jakarta, the ratio between the number of vehicles by road is 9: 0.01. It can be seen from the state highway that has a designation freeway that also experiencing congestion. By doing so, the use of the freeway now become less effective. Because apart from a very unbalanced ratio is, information on traffic density also is still not effective, so prospective users of the motorway had already stuck in traffic before choosing other alternative pathways.

Currently the system is being used to monitor traffic density, especially toll roads is still based on the manual calculation and visual. To that end, the system most likely can work automatically by making use of the camera as the medium and using object tracking to analyze the behavior of the vehicle. With the application of the method of object tracking can count the number of vehicles that can determine the density of traffic statistics quickly. So that this output information can be passed on to potential users, users, and operators of toll roads. The first stages of object tracking that detects objects that are then tracked their movements. The method used to explore the object is Particle Filter. Particle filter is an object tracking algorithm that uses a recursive estimator to generate particles attached to objects with the target color. Particle filter also has reliability in improving efficiency and effectiveness in tracking the object as far to the examination area of the object. To test this method will use the video from an existing dataset or using a video obtained privately.

Results obtained by using the method of particle filters based on the number of particles generated have a fairly high level of reliability in determining the centroid as a feature of an object that is the extent of the deviation of 2,8 pixel for the generation of as much as 10%. In addition the level of accuracy provided by the system is equal to 91,22% in determining the calculation of the number of vehicles and 94,41% in determining the speed of each vehicle. From the level of accuracy obtained, based on the operating characteristics of the classification results obtained density on the entire video is being tested that has a density value of 23−60 vehicles / km or an intermediate level.

Keywords: statistics on traffic density, tolls road, object tracking, vehicle tracking, vehicle counting, Particle Filter.