Mathematical Study for Traffic Flow and Traffic Density in Kigali Roads

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Abstract : This work investigates a mathematical study for traffic flow and traffic density in Kigali city roads and the data collected from the national police of Rwanda in 2012. While working on this topic, some mathematical models were used in order to analyze and compare traffic variables. This work has been carried out on Kigali roads specifically at roundabouts from Kigali Business Center (KBC) to Prince House as our study sites. In this project, we used some mathematical tools to analyze the data collected and to understand the relationship between traffic variables. We applied the Poisson distribution method to analyze and to know the number of accidents occurred in this section of the road which is from KBC to Prince House. The results show that the accidents that occurred in 2012 were at very high rates due to the fact that this section has a very narrow single lane on each side which leads to high congestion of vehicles, and consequently, accidents occur very frequently. Using the data of speeds and densities collected from this section of road, we found that the increment of the density results in a decrement of the speed of the vehicle. At the point where the density is equal to the jam density the speed becomes zero. The approach is promising in capturing sudden changes on flow patterns and is open to be utilized in a series of intelligent management strategies and especially in noncurrent congestion effect detection and control.

Keywords : statistical methods, traffic flow, Poisson distribution, car moving technics
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