ABSTRAK

Titik kepadatan lalu lintas pada jalan raya di Kabupaten Semarang tersebar di berbagai kawasan industri, tiga di antaranya yaitu Kecamatan Bergas, Kecamatan Bawen, dan Kecamatan Ambarawa dimana Kecamatan tersebut tepat berada di tengah Kabupaten Semarang dilewati jalur utama yang menjadi penghubung antara Kota Semarang dengan kota-kota Joglosemar. Seiring dengan berkembangnya teknologi, lokasi kejadian kecelakaan lalu lintas dapat dipetakan secara 2D dengan mengimplementasikan metode pembagian segmen dengan radius 1 km dan *Kernel Density.* Secara 3D pengolahan *Space Time Cube* mampu merepresentasikan aspek *spatiotemporal* berdasarkan representasi ruang dan waktu pada titik kejadian kecelakaan lalu lintas. Lanjutan dari metode *Space Time Cube* merupakan *Emerging Hot Spot Analysis* yang dapat menghasilkan tren kecelakaan baik *Hot* maupun *Cold* dari waktu ke waktu. Hasil penelitian menunjukkan jumlah kejadian kecelakaan tertinggi terdapat pada tahun 2022 dengan frekuensi sebesar 126 serta jumlah korban sebesar 159 dimana kecelakaan paling banyak terjadi di hari senin yang termasuk hari kerja yaitu sebanyak 179 kejadian. Pada pengolahan berbasis segmen 1 km berdasarkan jumlah kejadian, ruas 1 dan ruas 2 tidak memiliki segmen dengan tingkat kerawanan tinggi. Pada pengolahan segmen 1 km berbasis fatalitas korban, segmen dengan tingkat kerawanan tinggi pada ruas 1 terjadi pada Jl. Soekarno – Hatta (8) serta pada ruas 2 terjadi pada Jl. Slamet Riyadi (1). Hasil *Kernel Density* berbeda dengan hasil pengolahan kerawanan berbasis segmen dikarenakan perhitungan radius antara *Kernel Density* dengan pengolahan berbasis segmen berbeda dimana *Kernel Density* memperhitungkan kepadatan titik-titik kecelakaan berupa luasan lingkaran ($\boldsymbol{\pi}r^2$) berdasarkan sebaran titik, sedangkan segmen jalan per 1 km diperhitungkan sesuai panjang jalan. Visualisasi *Space Time Cube 3D* menghasilkan susunan *bins* yang terdiri dari 10 *bins* atau 10 tahun dari 2014 hingga 2023. Pada hasil *Emerging Hot Spot Analysis* berdasarkan jumlah kejadian fatalitas korban, menghasilkan beberapa *trend* seperti 'Sporadic Hot Spot', 'Sporadic Cold Spot', 'Consecutive Hot Spot', dan 'Consecutive Cold Spot'

Kata Kunci: Kecelakaan Lalu Lintas, *Kernel Density, Space Time Cube, Emerging Hot Spot Analysis*

ABSTRACT

Traffic density points on highways in Semarang Regency are spread in various industrial areas, three of which are Bergas District, Bawen District, and Ambarawa District where the District is right in the middle of Semarang Regency passed by the main route that connects Semarang City with Joglosemar cities. Along with the development of technology, the location of traffic accidents can be mapped in 2D by implementing the method of dividing segments with a radius of 1 km and Kernel Density. In 3D, Space Time Cube processing is able to represent spatiotemporal aspects based on the representation of space and time at the point of a traffic accident. The continuation of the Space Time Cube method is an Emerging Hot Spot Analysis that can produce crash trends both Hot and Cold from time to time. The results showed that the highest number of accidents occurred in 2022 with a frequency of 126 and the number of victims was 159, where the most accidents occurred on Mondays including weekdays, which were 179 incidents. In 1 km segment-based processing based on the number of events, segment 1 and segment 2 do not have segments with a high level of vulnerability. In the processing of the 1 km segment based on victim fatality, the segment with a high level of vulnerability on section 1 occurred on Jl. Soekarno - Hatta (8) and on section 2 occurred on Jl. Slamet Riyadi (1). The results of Kernel Density are different from the results of segment-based vulnerability processing because the calculation of the radius between Kernel Density and different segment-based processing where Kernel Density takes into account the density of accident points in the form of circle area (πr2) based on point distribution, while road segments per 1 km are calculated according to road length. Space Time Cube 3D visualization generates an array of bins consisting of 10 bins of 10 years from 2014 to 2023. The results of Emerging Hot Spot Analysis based on the number of fatality events of victims, produced several trends such as 'Sporadic Hot Spot', 'Sporadic Cold Spot', 'Consecutive Hot Spot', and 'Consecutive Cold Spot'

Keywords: Traffic Accident, Kernel Density, Space Time Cube, Emerging Hot Spot Analysis