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Using Wavelet Transform for Traffic Incident Detections

Traffic incidents are non-recurrent and abnormal events that disrupt the normal flow of traffic and create a bottleneck in the road network. This project will focus on the capabilities of wavelet transform (WT) for analyzing important features related to bottleneck activations and traffic oscillations in congested traffic in a systematic manner. WT is a time-frequency decomposition tool that is particularly effective in extracting local information from non-stationary time series. Unlike the Fourier transform (FT), WT provides both frequency (called scale in wavelet terminology) and time representation.

WT has been adopted to investigate various traffic-related issues, such as automatic detection of freeway incidents (Adeli and Samant 2000; Ghosh-Dastidar and Adeli 2003; Karim and Adeli 2002; 2003; Samant and Adeli 2000; 2001), traffic features around freeway work zones (Adeli and Ghosh- Dastidar 2004; Ghosh-Dastidar and Adeli 2006), traffic flow forecasting (Boto-Giralda et al. 2010; Jiang and Adeli 2005; Xie et al. 2007), and traffic pattern recognition (Jiang and Adeli 2004). These pioneering studies have demonstrated the potential of WT in analyzing non- stationary or noisy.

I will use Inrix Nebraska 2016 dataset for this project.