Expectation-Maximization Based Algorithm for Pattern Recognition in Traffic Speed Distribution

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Abstract

Understanding driving behavior is a complicated researching topic. To describe accurate speed, flow and density of a multiclass users traffic flow, an adequate model is needed. Mostly, user-classes are categorized by vehicle type characteristics. However, driving behavior is also influenced by drivers and socio-economic characteristics. Categorizing user-class by vehicle type may not reflect multiclass users traffic flow properly. On the other hand, driving behavior is studied through tracking trace of individual vehicles, experimenting by driving simulator or inquiring by questionnaire generally. It costs a lot and may produce bias because of design of questionnaire or experiment. Therefore, a new method, which is based on pattern recognition technique, is proposed to classify driving behavior in multiclass user traffic flow. In this study, the speed is considered as the result of driving behavior and the speed distribution on a road is assumed to be a mixture of Gaussian distributions. According to the assumptions, the expectation-maximization algorithm is employed to train and classify different user-classes. With the method, an economical and automatic way for traffic data processing and parameter extracting is obtained.

Keyword：signal processing, pattern recognition, Gaussian mixture, multiclass users traffic flow, expectation-maximization algorithm.