Noise

1- A Novel K-Means Clustering Algorithm with a Noise Algorithm for Capturing Urban Hotspots

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Abstract:
With the development of cities, urban congestion is nearly an unavoidable problem for almost every largescale city. Road planning is an effective means to alleviate urban congestion, which is a classical nondeterministic polynomial time (NP) hard problem, and has become an important research hotspot in recent years. A K-means clustering algorithm is an iterative clustering analysis algorithm that has been regarded as an effective means to solve urban road planning problems by scholars for the past several decades; however, it is very difficult to determine the number of clusters and sensitively initialize the center cluster. In order to solve these problems, a novel K-means clustering algorithm based on a noise algorithm is developed to capture urban hotspots in this paper. The noise algorithm is employed to randomly enhance the attribution of data points and output results of clustering by adding noise judgment in order to automatically obtain the number of clusters for the given data and initialize the center cluster. Four unsupervised evaluation indexes, namely, DB, PBM, SC, and SSE, are directly used to evaluate and analyze the clustering results, and a nonparametric Wilcoxon statistical analysis method is employed to verify the distribution states and differences between clustering results. Finally, five taxi GPS datasets from Aracaju (Brazil), San Francisco (USA), Rome (Italy), Chongqing (China), and Beijing (China) are selected to test and verify the effectiveness of the proposed noise K-means clustering algorithm by comparing the algorithm with fuzzy C-means, K-means, and K-means plus approaches. The compared experiment results show that the noise algorithm can reasonably obtain the number of clusters and initialize the center cluster, and the proposed noise K-means clustering algorithm demonstrates better clustering performance and accurately obtains clustering results, as well as effectively capturing urban hotspots.

2- Primary Neural Degeneration in Noise-Exposed Human Cochleas: Correlations with Outer Hair Cell

Loss and Word-Discrimination Scores

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Abstract:
Animal studies suggest that cochlear nerve degeneration precedes sensory cell degeneration in both noise-induced hearing loss (NIHL) and age-related hearing loss (ARHL), producing a hearing impairment that is not reflected in audiometric thresholds. Here, we investigated the histopathology of human ARHL and NIHL by comparing loss of auditory nerve fibers (ANFs), cochlear hair cells and the stria vascularis in a group of 52 cases with noise-exposure history against an age-matched control group. Although strial atrophy increased with age, there was no effect of noise history. Outer hair cell (OHC) loss also increased with age throughout the cochlea but was unaffected by noise history in the low-frequency region (>2 kHz), while greatly exacerbated at high frequencies (>= 2 kHz). Inner hair cell (IHC) loss was primarily seen at high frequencies but was unaffected by noise at either low or high frequencies. ANF loss was substantial at all cochlear frequencies and was exacerbated by noise throughout. According to a multivariable regression model, this loss of neural channels contributes to poor word discrimination among those with similar audiometric threshold losses. The histopathological patterns observed also suggest that, whereas the low-frequency OHC loss may be an unavoidable consequence of aging, the high-frequency loss, which produces the classic down-sloping audiogram of ARHL, may be partially because of avoidable ear abuse, even among those without a documented history of acoustic overexposure.