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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	The Soft Story Challenge to Architectural Design in Earthquake-Prone Areas		
Jumlah Penulis	:	4 orang (Livian Teddy, Gagoek Hardiman, **Nuroji**, Sri Tudjono)		
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Semarang, Oktober 2022

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Semarang, Juni 2020
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Adaptive Cancellation of Localised Environmental Noise

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ABSTRACT

Noise cancellation systems are useful in applications such as speech and speaker recognition systems where the effects of environmental noise have to be taken into considerations. A robust method for the cancellation of localised noise in noisy speech signals using subband decomposition and adaptive filtering is presented and described in this paper. The subband decomposition technique is based on low complexity octave filters that split the noisy speech input into subsidiary bands. A thresholding technique is then applied to the subbands to determine the presence or absence of environmental noise. This is used to control an adaptive filter which only responds to the noisy parts of the speech spectrum hence localising the adaptation process only on these segments. The Normalised Least Mean Squares algorithm (NLMS) is used for the adaptation process. A comparison with a similar system without localising the environmental noise shows the superior performance of the proposed system. It has been shown to perform better in terms of computational costs and convergence rate when compared to a system that does not take advantage of the information regarding the presence or absence of noise in a specific part of the speech spectrum. More than 35 dB of noise has been eliminated in less iterations than in conventional approach which needs longer time to reach steady state.

Keywords: Adaptive filters; noise cancellation; noise localisation

INTRODUCTION

In many established and emerging digital speech applications the effects of environmental noise has to be taken into considerations (Arowitz 2016, Matrouf et al. 2015, Jiang et al. 2017). This is because algorithms that perform well in a noise-free environment may degrade significantly in real-world environments where noise may be prevalent and unavoidable. In particular, environmental noise has a negative impact on the performance of feature extraction techniques and systems that are based on them. For example, the popular Mel-frequency Cepstral Coefficients (MFCC) used in many speech recognition applications is highly succeptible to environmental noise (Hermus & Wambacq 2006; Sahidullah & Saha 2012; Bhattacharjee et al. 2016).

The problem becomes severe when the noise constantly changes with time. This is because the spectrum of the noise changes according to the noise type. For eaxmple, white noise has a flat wideband spectrum while coloured noise may occupy a limited part of the spectrum in any frequency band. Environmental noise such car noise, for example, occupies the lower parts of the speech spectrum (Kozou et al. 2005; Zhao et al. 2014).

Adaptation process such as in adaptive filtering has been used to remove changing noise from speech signals. Adaptive filters use recursive filtering algorithms such as Least Mean Squares (LMS) and its variations to adjust the coefficients of the filter in response to the changing noise in the speech signals (Paolo 2008; Sayed 2011). In order to improve performance, adaptive filtering has been combined with subband decomposition using filter banks of various types (Lee et al. 2009; Noor et al. 2011). The advantage of using subband decomposition is that the overall coefficient update rate can be reduced resulting in lower computational complexity. In addition, in multirate systems, subband signals are usually downsampled which results in the whitening of the input signals and therefore an improved convergence performance.

The choice of filter banks and adaptation algorithms are also of importance to further reduce complexity (Zheng et al. 2017; Cheer & Daley 2017; Yu et al. 2016; Lorente et al. 2014; Reddy et al. 2011; Milani et al. 2009; Wong et al. 2014). However, the implementation of the adaptive filtering process has been assigned to all subbands. This is not necessary if the noise is located in certain bands while not in others which is the case for environmental coloured noise. This paper presents a noise cancellation system that is capable of removing localised noise from speech signals based on subband processing, thus improving convergence and reducing complexity. Low-complexity octave filter banks are used for subband decomposition and the outputs of the filter banks are analysed in order to localise the noisy segments of the input speech. These outputs are fed to the adaptive filter to change the filter coefficients accordingly only when noise is present. As low-complexity is desired, the Normalised Least Mean Squares (NLMS) algorithm

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Evaluation and Analysis of Traffic Flow at Signalized Intersections in Nicosia Using of SIDRA 5 Software

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ABSTRACT

Traffic congestion on road networks and signalized intersections have posed significant problems worldwide. One of the significant ways to reduce traffic congestion in cities is by improving the public transportation system. Therefore, it is essential to use advanced software tools to ensure that the current system can be controlled and evaluated. This study was aimed at assessing and analysing the performance of traffic flow at signalized intersections and roundabouts at peak hours in the city of Nicosia (northern part of the island) using the SIDRA INTERSECTION 5 software. It was also aimed at comparing the performance of traffic flow during the morning and evening peak hours at four intersections and two roundabouts. The parameters used to assess the performance of the traffic flow were the level of service, delays and delayed travel speed, performance index, operating cost, fuel consumption, and carbon dioxide emission. It was found that the SIDRA INTERSECTION software was able to give an estimate of the current situation of traffic flow in the city. The results showed that the level of service was low, resulting in low speeds and lots of delays during the evening and morning peak hours. The delay was up to 9318.9 seconds and the fuel consumption was nearly 1431.6 lit/h, while the CO_2 emission was up to 3594.7 kg/h.

Keywords: SIDRA intersection 5; traffic congestions; signalized intersections; roundabouts and level of service

INTRODUCTION

Road traffic congestion comprises of several complex procedures and incorporates numerous components cooperating simultaneously. In such a severe problem condition a simulation modeler can be a very effective tool as it provides evaluations for various traffic condition conditions (Papageorgiou et al. 2006). The increment in the demand for private transportation will also increase traffic congestion during peak hours (Yahia 2017; Yahia et al. 2017). Additionally, flaws in the public transport system will result in longer waiting time (delay), and also very little headways between vehicles, particularly in the city of Nicosia, Northern Cyprus. The number of vehicles registered in Nicosia, Northern Cyprus was up 4.5% in 2015 compared to 2013 over 175982 vehicles. According to the state planning organization, statistics and research department Nicosia in 2017 the number of registered vehicles increase nearly 66% compared with 2015, including registered vehicles around 182709 and none-registered vehicle approximately 109665 (Statistics and Research Department, Nicosia 2017). Therefore, with those huge numbers of vehicles on the road, the responsible authorities for the roads are required to develop tidal traffic capacity by controlling and estimating the future growth of traffic movement as well as to find out appropriate solutions to prevent the overcrowding of traffic congestion on intersections and roundabouts (Akçelik et al. 1999). These will be done using intelligent software called SIDRA INTERSECTION 5 which is "a micro-analytical traffic evaluation tool that employs lane-by-lane and vehicle drive cycle models" (Irtema et al. 2015). Its function is to compare different treatments of separate intersections as well as networks of intersections involving signalized and un-signalized intersections roundabouts.

The performance of traffic flow in Kuala Lumpur and Petaling Jaya was evaluated using SIDRA INTERSECTION 4, it showed a reduction in the average delay and fuel consumption while increasing the travel speed. A significant reduction was also observed from the results that the traffic flow at the intersections and roundabouts managed to be optimized (Albrka et al. 2014). This study aims to evaluate the existing traffic flow system at signalized four intersections and two roundabouts in busy areas in Nicosia (northern part of the island) and establish a comparative study between the morning and evening peak hours.

METHODOLOGY AND STUDY AREA

The study focused on traffic flow at signalized intersections and roundabouts, to evaluate the current situation of traffic system in the city. The performance of the traffic flow was analyzed and assessed using SIDRA INTERSECTION 5 Software. Also, after the observation and site selection, the parameter was collected for the field, namely, the volume of traffic including (cars, motorcycles, van, trucks, and buses), phases movement of intersections with the cycle time and the geometric design of intersections. The volume of traffic, which the most critical factor when it was collected, must be collected during regular working days besides avoiding severe weather conditions and natural traffic conditions when accidents occur.