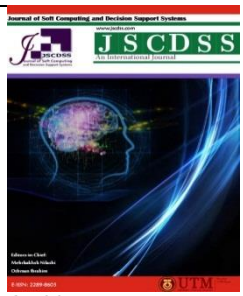
An International Journal
JSCDSS
http://www.jscdss.com
Vol.7 No.3 June 2020: 13-22
Article history:
Accepted 29 March 2020
Published online 30 March 2020

Journal of Soft Computing and Decision Support Systems



E-ISSN: 2289-8603

Review of Terrestrial and Satellite Networks based on Machine Learning Techniques

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Abstract

It has been broadly admitted that the upcoming networks will require to provide meaningfully more capacity than the existing ones to be able to deal with the growing traffic requirements of the users. Specifically, in the areas that optical fibers are improbable to be spread out because of the economical limitations; so, this would be a very crucial challenge. To address the above-mentioned issue, the combination of Terrestrial and Satellite Networks (TSNs) together would be an option. Satellite networks can cover enormous regions and current improvements have significantly raised the existing capacity while diminishing the cost. However, the characteristics of the geostationary satellite links are potentially various than the frequent terrestrial ones, essentially because the propagation time of the signal is high. The current study reviews the cutting-edge issues with respects to TSNs with machine learning methods.

Keywords: 5G, Satellite Communication Networks, Terrestrial Communication Networks, Quality of Service, Machine Learning

1. Introduction

Nowadays in mobile communication networks, the developments and integrations play a crucial role and these factors present clear effects in social and economic advancement. During the years, the recent and emergent networks have been required to have this ability to handle powerful growth regarding the traffic volume (An et al., 2016). For instance, the future Fifth Generation (5G) communication networks that are recently being clarified and are anticipated to be prepared for the trade by upcoming year, it is expected to have low latency, more reliability, tenfold yield per user and higher traffic volume (Johansson et al., 2015). The multiple amounts of traffic volume will present a significant problem for operators, specifically in the countryside regions (Khan et al., 2011). As an example, the technologies which have been utilized in the backhaul segment in today's life that includes Microwave Radio Links (MRLs) (Boccardi et al., 2014), Optical Fibres (OFs) (Soldani & Manzalini, 2015) and Copper Connection (CC) (Mukherjee, 2018) are avoided by the ecumenical limitations (Niephaus et al., 2016). Furthermore, the latest method related to the network supplies links which are free of congestion cannot deal with the anticipated expansion in the data traffic. Therefore, the networks should be taken into account as a resource restriction (Rost et al., 2014).

To solve this issue, a promising methodology is to combine the Satellite Communication Networks (SCNs) as an original part of current terrestrial infrastructures (Deng et al., 2019; Wu et al., 2019; Zhu et al., 2019). As the Sattelite (SAT) links provide broadband coverage and elastic services everywhere, these can transfer highly throughput connections and extra volume wherever it requires on a quite pliable foundation (Takahashi et al., 2019). While in comparison with the most of the Terrestrial Network (TN) (Huang et al., 2019) technologies, there are high various features in terms of permanence of the link and latency in the links regarding both wire and wireless links of the Satellite Networks (SN) (Yan et al., 2019).

Although the goal of the current methods is to provide services through Geostationary Earth Orbit (GEO) satellites it is not possible to obtain the same Quality of Experience (QoE) to TNs while the application (which are in the real-time mode) are being utilized (Niephaus et al., 2018). In SNs, when the time in signal propagation is high, the rate of the latency rises significantly; as a result, the QoE of the user will be low (Parvez et al., 2018). From the other points of view, SNs are provided to transmit and multicast different services, while they can achieve a possibly infinite number of receivers by one broadcast. Provided the supremacy of video traffic in the upcoming networks (Khambari & Ghita, 2019) and emergent edge catching methods (Chang et al., 2018). The list of acronyms used in this work is provided in Table 1.