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Hyperparameter tuning using Lévy flight and interactive crossover-based reptile search algorithm for eye movement event classification

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Introduction: Eye movement is one of the cues used in human–machine interface technologies for predicting the intention of users. The developing application in eye movement event detection is the creation of assistive technologies for paralyzed patients. However, developing an effective classifier is one of the main issues in eye movement event detection.

Methods: In this paper, bidirectional long short-term memory (BILSTM) is proposed along with hyperparameter tuning for achieving effective eye movement event classification. The Lévy flight and interactive crossover-based reptile search algorithm (LICRSA) is used for optimizing the hyperparameters of BILSTM. The issues related to overfitting are avoided by using fuzzy data augmentation (FDA), and a deep neural network, namely, VGG-19, is used for extracting features from eye movements. Therefore, the optimization of hyperparameters using LICRSA enhances the classification of eye movement events using BILSTM.

Results and Discussion: The proposed BILSTM–LICRSA is evaluated by using accuracy, precision, sensitivity, F1-score, area under the receiver operating characteristic (AUROC) curve measure, and area under the precision–recall curve (AUPRC) measure for four datasets, namely, Lund2013, collected dataset, GazeBaseR, and UTMultiView. The gazeNet, human manual classification (HMC), and multi-source information-embedded approach (MSIEA) are used for comparison with the BILSTM–LICRSA. The F1-score of BILSTM–LICRSA for the GazeBaseR dataset is 98.99%, which is higher than that of the MSIEA.

KEYWORDS

accuracy, bidirectional long short-term memory, eye movement event classification, fuzzy data augmentation, F1-score, Lévy flight and interactive crossover, reptile search algorithm

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ORIGINAL

Enhancing Public Safety: A Real-time Social Distance Monitoring with Computer Vision and Deep Learning

Mejora de la seguridad pública: Una monitorización social a distancia en tiempo real con visión por computador y aprendizaje profundo

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ABSTRACT

In spite of the fact that the COVID-19 epidemic has lately afflicted millions of individuals all over the world, the number of people who are being affected is continuing to climb. In response to the ongoing pandemic scenario throughout the world and in an effort to stop the virus from further disseminating, a number of governments have initiated a number of groundbreaking preventative measures. One of the most effective methods for warding off the spread of infectious diseases is maintaining adequate social distance. In the context of a real-time top view environment, the purpose of this study survey is to propose the use of a social distance framework that is built on deep learning architecture as a preventative strategy for maintaining, monitoring, managing, and lowering the amount of physical connection that occurs between individuals.
In order to identify people in the photographs, we made use of a number of different deep learning detection models, including R-CNN, Fast R-CNN, Faster-RCNN, YOLO, and SSD. Because of the significant differences between the top and bottom views of a human's appearance, the architecture was trained using the top view human data set. After that, the Euclidean distance is utilised to derive a pair-wise distance estimate between the individuals depicted in a picture. Using the information obtained from a detected bounding box, one may determine where the centre point of a single detected bounding box is located. A violation threshold is constructed, which is determined by the information of a person's distance to a pixel and determines whether or not two people are in breach of social distance.

Keywords: Social Distance; Coronavirus; Disease; Monitoring System; Detection Model and Deep Learning.

RESUMEN

A pesar de que la epidemia de COVID-19 ha afectado últimamente a millones de personas en todo el mundo, el número de afectados sigue aumentando. En respuesta al actual escenario pandémico en todo el mundo y en un esfuerzo por impedir que el virus siga propagándose, varios gobiernos han puesto en marcha una serie de medidas preventivas pioneras. Uno de los métodos más eficaces para evitar la propagación de enfermedades infecciosas es mantener una distancia social adecuada. En el contexto de un entorno de vista cenital en tiempo real, el propósito de esta encuesta de estudio es proponer el uso de un marco de distancia social construido sobre una arquitectura de aprendizaje profundo como estrategia preventiva para mantener, supervisar, gestionar y reducir la cantidad de conexión física que se produce entre los individuos. Con el fin de identificar a las personas en las fotografías, hicimos uso de una serie de diferentes modelos de detección de aprendizaje profundo, incluyendo R-CNN, Fast R-CNN, Faster-RCNN, YOLO, y SSD. Debido a las diferencias significativas entre las vistas superior e inferior de la apariencia humana, la arquitectura se

Blockchain-Based Vaccination Record Tracking System

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***Abstract*—Blockchain technology is basically a decentralized database maintained by applicable parties and has been extensively used in colorful scripts similar as logistics and finance. In terms of operations in the medical field, it's getting increasingly important because the case's symptoms may be related to a certain vaccine. Whether the case has been vaccinated with this vaccine will lead to different individual results by the croaker. This study proposes a traceable blockchain-grounded vaccination record storehouse and sharing system. In the proposed system, the case gets the vaccination at any legal clinic and the VR can be saved accompanied by the hand into the blockchain center, which ensures traceability. When the case visits the sanitarium for treatment, the croaker can gain the details of the VR from the blockchain center and also make an opinion. The security of the proposed system will be defended by the programmed smart contracts. The proper record storage after encryption will ensure data privacy, integrity and security. Blockchain tracebility uses block-chain technology to record the movement of a product in the supply chain.**

Keywords*—Blockchain technology, decentralized, vaccine record tracking, integrity, smart contracts, vaccination record storage, traceability

I. Introduction

The global spread of Coronavirus Disease 2019 (COVID-19) in 2020 has posed unprecedented challenges to the healthcare sector, highlighting the use of innovative solutions to mitigate the spread of infections [1]. Contact tracing applications have emerged as a potential tool to break the chain of COVID-19 infections by identifying close contacts of positive cases and informing them about the possibility of being infected [2]. However, current contact tracing technologies face challenges in terms of privacy, accountability, and transparency, which can hinder their effectiveness and user adoption [3]. Our proposed method is noteworthy for its ability to track the origin and path of transactions related to vaccinations before they are used, in addition to preventing the circulation of counterfeit vaccines.

In this research paper, we propose a blockchain-based contact tracing solution that leverages the intrinsic features of blockchain technology to address the deficits of current contact tracing technologies [4]. Our solution aims to respect user privacy, provide transparency, and enable accountability by leveraging the decentralized, transparent, and immutable nature of blockchain technology [5]. Specifically, we utilize this blockchain with the smart contracts to eliminate the third-party servers, centralization, and identity abuse. Convergence algorithms, like proof of work or proof of stake, are used by the blockchain network to reach consensus on the ledger's current state and stop illegal changes. The accuracy and openness of the vaccination tracking data are therefore guaranteed.

Our solution utilizes the programmable logic of smart contracts to ensure transparency and trust among the different participants. All transactions on the blockchain are signed by their creators, holding every on-chain participant accountable for their actions [6]. By leveraging the immutable logs of the distributed ledger, our solution enforces transparency and trust, and eliminates the risks associated with centralized storage of user data [7]. The system architecture of our suggested application, Vaccine Tracker, which makes use of blockchain technology to offer complete visibility and transparency throughout the COVID vaccination supply chain. To guarantee the precision and dependability of vaccine tracking data, the Vaccine Tracker system uses a variety of algorithms for supply chain tracking and validation.

In this paper, we present the architecture, design, and implementation details of our blockchain-based contact tracing solution [8]. We also discuss the potential of blockchain technology in mitigating the spread of infections during the COVID-19 pandemic and highlight the advantages of using Ethereum blockchain with smart contracts for contact tracing [9]. The proposed architecture includes manufacturer Component which adds relevant information. The system verifies the information supplied by the manufacturer, such as location tracking and QR code generating. Our research contributes to the growing body of literature on blockchain technology in healthcare and contact tracing, and provides requirements for future research and practical applications [10]. Utilising cryptographic methods like digital signatures and hashing, the algorithm verifies the security and legitimacy of the information it has acquired from the blockchain. This guarantees the immutability and tamper-proof nature of the data recorded on the blockchain.

II. Related Work

Several studies and projects have explored the want of blockchain in healthcare, including its application in COVID-19 vaccination efforts. Here, we highlight some of the notable related work and contributions in the field.

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Automatic Music Control Using Image Processing and MediaPipe

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