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Editorial

Cloud-Based Multimedia Services for healthcare and other related applications

Cloud-based multimedia services play an important role in seamlessly providing and managing health, sports, and other services ubiquitously. The potential applications of cloud media services, and technologies revolutionize today's healthcare system. Such services and technologies facilitate healthcare professionals to have instant access to essential information for efficient monitoring and decision making. Since cloud media services technology development for healthcare is growing, numerous research opportunities are emerging in a broad spectrum of this application domains.

With the explosive growth of multimedia (MM) computing, we are observing the trend of using various multimedia tools, techniques and services in providing and managing e-health services ubiquitously. These services and technologies facilitate physicians and other health care professionals to have immediate access to e-health information for efficient decision making as well as better treatment. The realization however of multimedia services for e-health introduces several challenges. The passion for media results in a large number of Internet traffic that impose to make a tradeoff between QoS (Quality of Service) and cost in media network design for health care. Content distribution network (CDN) can be utilized to cache e-health media contents like real-time medical images, videos, etc. However, lack of dynamic resource provisioning at CDN nodes limits effectiveness for the demand of computing power, storage space and network bandwidth to better support healthcare initiatives. One potential solution for addressing all aforementioned issues is the introduction of cloud-based multimedia service for healthcare.

Cloud computing fits well as an enabling technology in this scenario as it presents a flexible stack of computing, storage and software services at low cost. The cloud-based media services can provide a high quality of experience for physicians, clinics, and other caregivers anytime and from anywhere seamlessly. So, the papers in this issue strive to foster state-of-the-art researches, methodologies and systems in the design, development, deployment and innovative use of cloud-centric multimedia services, tools and technologies for healthcare.

Given the importance and timeliness of the topic, we organized this special issue with the objective of compiling the latest advancements and future research expectations in the related areas. To this end, we are pleased to present five (5) papers out of seventeen (17) papers dealing with the advanced research on Cloud-Based Multimedia Services for healthcare and other related applications. These papers are selected following a rigorous process with the help of reviewers around the globe. They addressed the cloud-oriented media services for healthcare and presented solutions for these problems.

The paper by Zhang et al. [1] titled "iDoctor: Personalized and professionalized medical recommendations based on hybrid matrix factorization" proposes a novel approach named iDoctor to provide personalized healthcare recommendation. Considering the subjectivity in users' reviews, the authors propose to calculate the emotional offset for revising the original rating, in order to provide more objective references. Moreover, the authors improve the conventional matrix factorization that Latent Dirichlet Allocation is used to extract user preference and doctor features. Through sufficient experiment, it validates that iDoctor provides more accurate recommendation services than other similar approaches.

The paper [2] titled "A multimedia healthcare data sharing approach through cloud-based body area network" reports the design issues of a network architecture that combines WBAN (Wireless Body Area Network) and Cloud for delivery and sharing of huge media healthcare data to remote terminals timely with guaranteed QoS support. The proposed network model is designed as four layers: perception layer, network layer, cloud computing layer, and application layer. In the network, the integration of TCP/IP and Zigbee in the coordinator devices is utilized. Consequently, WBAN coordinators can compatibility interact with various local networks such as WiFi and LTE network. In addition, Content Centric Networking (CCN) as well as adaptive streaming was integrated with the proposed network model to improve the quality of real-time data dissemination service from WBAN. Various simulations were conducted using OPNET simulator to show the feasibility of the proposed architecture in terms of transmitting a huge amount of media healthcare data in real-time under traditional IP-based network.

The paper [3] "Cloud based framework for Parkinson's disease diagnosis and monitoring system for remote healthcare applications" proposes a cloud framework for detecting Parkinson's disease at an earlier stage by measuring Dysphonia of a person or patient and monitoring him/her on a regular basis. Patients and healthcare professionals use a cloud based automated system which takes the voice of a person or patient as input, stores it into the patient file residing in the cloud database and identifies the PD patient if his/her voice indicates Dysphonia. The system uses

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Feedforward Backpropagation based Artificial Neural Network for classifying PD based on extracted feature from recorded voice with high accuracy. It can also avail to provide alert to remote specialists if needed, and they can diagnose and suggest treatment plan to the patient using this framework.

Mobile e-health applications provide users and healthcare practitioners with an insightful way to check users/patients' status and monitor their daily calorie intake. The paper by Peddi et al. [4] titled "An Intelligent Cloud-Based Data Processing Broker for Mobile e-Health Multimedia Applications" proposes a mobile e-health calorie system that can classify the food objects in the plate and further compute the overall calorie of each food object with reduced response time without affecting the accuracy of the classification and calorie computation of the food object. To achieve this goal, heavy computational parts of the system are offloaded to the cloud, however, existing cloud offloading strategies would not be able to fully utilize the unique characteristics of food objects including: food object categories (single, multiple and mixed food object), food ingredients, food specific features (textures, shape, color and size) that could be integrated into the cloud computing model to provide more accurate and improved time specific results. The solution is to employ an intelligent cloud-broker mechanism where the food classification and the calorie computation steps are strategically integrated in the cloud model in a manner that it fully utilizes the unique food characteristics. The implementation results of our system showed that the proposed cloud broker results in a 45% gain in the overall time taken to process the images in the cloud. With the use of dynamic cloud allocation mechanism, we were able to reduce the average time consumption by 77.21% when 60 images were processed in parallel.

Nowadays, several factors affect the wellness of human being negatively. Physical inactivity is one of these factors that gained wide attention globally. In this respect Badawi et al. [5] in "Mobile cloud-based physical activity advisory system using biofeedback sensors" suggest a promising solution for this phenomenon which is physical activity advisory system. They propose a mobile cloud-based physical activity advisory system that utilizes biofeedback sensor and environmental context to provide personalized advice at a suitable time and proper location. This advice is generated based on the amount of calories expenditure that resulted from performing various activities by tracking user's physical movements. To evaluate the proposed system, they conducted a three-month experiment on six users. For each user, they tracked the amount of burnt calories from the physical movements for a two-week period. Comparing the results shows positive effect of the proposed system in increasing users' physical activity levels by increasing the awareness of the calories being burned and providing environmental context aware advice according to this amount.

We would like to thank all the authors for their contributions and the reviewers for their efforts in respecting deadlines. Without their voluntary time, efforts, and dedication, this special issue would have never come to be. We would especially like to thank Prof. Peter Sloot for allowing us to have this special issue in FCGS. We would also like to acknowledge the support of his editorial team for their dedication and editorial support for this special issue. We hope that the papers from this special issue will contribute to the roadmap of emerging use of cloud-oriented multimedia services for healthcare. We hope that you will find the articles of this special issue to be informative and beneficial to the readers.

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