1. Delivering Personalized Content to Open-air Museum Visitors Using Geofencing

[Ivanov, R., V. Velkova, Delivering Personalized Content to Open-air Museum Visitors Using Geofencing, Int. Conf. Digital Presentation and Preservation of Cultural and Scientific Heritage, Vol. 12, pp. 141-150, 2022, Burgas, https://doi.org/10.55630/dipp.2022.12.11]

Abstract:
This paper presents the architecture and implementation of a service that delivers personalized content to open-air museum visitors. The service uses push notifications to deliver this content. Notifications can be delivered to all visitors or personalized - to a group of visitors or to a specific visitor. The service segments museum visitors according to their location and their profile, which is built dynamically over time. For the geospatial segmentation of visitors, geofencing is used - each visitor is assigned to a segment that corresponds to a specific geographic area - part of an open space or exhibit. The service allows localization of visitors by their GPS coordinates or by estimating their distance from Bluetooth Low Energy (BLE) beacons. The geofences are described as a polygons or circles. Geospatial segmentation is implemented using a NoSQL database MongoDB, which has built-in capabilities for working with geospatial queries. Depending on the profile, each visitor falls into one or several segments: professional researcher, non-professional researcher, inspiration seeker, casual visitor, and visitors with disabilities. For each visitor, personalized content is delivered, depending on the segments to which the visitor is assigned. The necessary experiments have been conducted and analyzed to prove the applicability of the service for real-time delivery of personalized content.

2. MICROSERVICE FOR CREATING GEOFENCES

[Velkova,V., Ivanov, R., MICROSERVICE FOR CREATING GEOFENCES, Int. Conf. INTERNATIONAL SCIENTIFIC CONFERENCE 18-19 November 2022, GABROVO, Vol. p125, pp.290-295, 2022, https://unitech2022.tugab.bg/en/thematic-sessions/computer-system-computer-technologies-and-information-security,https://unitech2022.tugab.bg/images/c2022/kst/p125.pdf]

Abstract:
This paper presents the architecture and implementation of a microservice for creating geofences and exporting their coordinates in GeoJSON format. The service allows describing geofences in three ways: (1) by a polygon; (2) by a circle with a given center and radius; and (3) by a circle that is approximated by a polygon. The service provides the ability to populate geofences with geo hashes in order to very quickly calculate which geofence the clients of a locationbased service fall into.

Different levels of accuracy and geohash generation strategies are supported. At this stage, the service exports the geofence information in a format adapted for MongoDB database. Experiments have been conducted for different types of geospatial queries with geofences generated by the proposed service (buildings and open spaces of the Technical University of Gabrovo). The experiments show that all types of queries are executed in real time with active 2dsphere database indexing

3. Tangible and Personalized Smart Museum Application

[Ivanov, R., V. Velkova, Tangible and Personalized Smart Museum Application, Int. Conf. Digital Presentation and Preservation of Cultural and Scientific Heritage, Vol. 13, pp. 97-106, 2023, Burgas, https://doi.org/10.55630/dipp.2023.13.9]

Abstract:
This paper presents the architecture of a Web app designed to deliver personalized content to museum visitors both indoors and outdoors. The app uses a tangible type of interface to obtain information about the museum's exhibits. For this purpose, each exhibit can be associated with an NFC tag, a Bluetooth Low Energy (BLE) beacon or a geofence in open-air museums. The service automatically profiles its users based on statistics about the preferred type of exhibits, media formats and time spent viewing each exhibit. Visitors can get the information they want about an exhibit even when the app is not running. Push notifications are used for this purpose. The necessary experiments have been conducted to prove the applicability of the service for real-time delivery of personalized content.

4. Mobile Application for Creating and Exporting Geofences

[*Velkova,V.,R.Ivanov, Mobile Application for Creating and Exporting Geofences,Int. 2023 International Conference Automatics and Informatics (ICAI), pp. 221-224, Varna, DOI:10.1109/ICAI58806.2023.10339052***]**

Abstract:
This paper discusses the design and testing of a mobile application for the interactive creation of geofences in the form of polygons. The application allows the visualization of the user's position on GPS maps, the input of the polygon points used to describe each geofence, and the export at any time of the already created geofences to a MongoDB database in GeoJSON format. The Mapbox GL-JS library are used to visualize GPS maps with the user's position, as well as to enter, edit and delete geofences. By leveraging MongoDB's geospatial query capabilities, services can be developed whose logic requires checking for approaching a geofence, entering or leaving in/out of a geofence. The application is used by the authors of the paper to

build a database of geofences that describe the contours of historic landmarks that are not visible on GPS street maps because only a portion of the building foundations have been preserved.

5. Microservice-Based Interface to ChatGPT

[Ivanov, Rosen & Velkova, Victoria. (2024). Microservice-Based Interface to ChatGPT ,IEEE International Conference on Automation ,Quality and Testing ,Robotics (AQTR 2024), pp.1-5., Cluj-Napoca,Romania, 10.1109/AQTR61889.2024.10554146.]

Abstract:
In today's digitally connected world, the emergence of conversational artificial intelligence powered by generative language models has ushered in a new era of human-computer interaction. Chatbots using these technologies are increasingly being used in a variety of scientific as well as social domains. These intelligent conversational agents, powered by advances in generative language models, offer a wide range of applications from customer support and healthcare to software development and education. This paper discusses the development of a microservice that works as an interface to ChatGPT through the GPT API. The goal is to facilitate the integration of next generation chatbots to distributed architecture services. Access to the microservice is implemented using an Advanced Message Queuing Protocol (AMQP) message broker. To conduct the experiments, a microservice was developed that provides a REST interface to the proposed microservice for clients that do not support the AMQP protocol.

6. Enhancing Museum Experiences: A Multi-Institution Mobile Multimedia Delivery System Using BLE Beacons.

[Ivanov, R., & Velkova, V. (2024). Enhancing Museum Experiences: A Multi-Institution Mobile Multimedia Delivery System Using BLE Beacons. Digital Presentation and Preservation of Cultural and Scientific Heritage, 14, 187–196. https://doi.org/10.55630/dipp.2024.14.17]

Abstract:
This paper presents a solution using Bluetooth Low Energy (BLE) beacon technology to enhance visitor experiences in museums, both indoors and outdoors. Organizations using the developed mobile service can associate text, images, video, and audio content to specific exhibits, providing a dynamic and engaging encounter

for visitors. This innovative approach extends applicability to a wide range of organizations, not just museum environments.

7. USER SEGMENTATION USING SOCIAL MEDIA PROFILES

[Velkova,V., USER SEGMENTATION USING SOCIAL MEDIA PROFILES, Int. Conf. INTERNATIONAL SCIENTIFIC CONFERENCE 21-22 November 2024, GABROVO, https://www.unitech.tugab.bg/archive/unitech-2024/thematic-session/computer-system-and-technologies, https://unitech.tugab.bg/images/2024/dokladi/4.COMPUTER_SYSTEMS_AND_TECHNOLOGIES/USER_SEGMENTATION_USING_SOCIAL_MEDIA_PROFILES.pdf]

Abstract:
This paper presents a methodology for segmenting users of digital services using OAuth authorization. By analyzing data from users' social media profiles, we can form user segments to improve personalized content delivery. The proposed approach involves collecting and processing data from social networks, identifying key user attributes and forming meaningful segments.

8. MOBILE APP FOR CONTENT DELIVERY FOR MUSEUM EXHIBITS USING NFC TECHNOLOGY

[Velkova,V., MOBILE APP FOR CONTENT DELIVERY FOR MUSEUM EXHIBITS USING NFC TECHNOLOGY, Int. Conf. INTERNATIONAL SCIENTIFIC CONFERENCE 21-22 November 2024, GABROVO, https://www.unitech.tugab.bg/archive/unitech-2024/thematic-session/computer-system-and-technologies,https://www.unitech.tugab.bg/images/2024/dokladi/4.COMPUTER_SYSTEMS_AND_TECHNOLOGIES/MOBILE_APP_FOR_CONTENT_DELIVERY_FOR_MUSEUM_EXHIBITS_USING_NFC_TECHNOLOGY.pdf]

Abstract:
This paper presents a mobile application for delivering content for museum exhibits using Near Field Communication (NFC) tags. The application is built using the Monaca Cloud IDE hybrid mobile application development environment. The goal of the presented development is to deliver multimedia content for a museum exhibit associated with an NFC tag. The identifier of each tag is associated with a specific exhibit. The application displays this content when the client brings his mobile phone close to an NFC tag.