19/09/2025

Zašto je meni ovo bitno?

UPRAVLJANJE INFORMACIONIM TEHNOLOGIJAMA

Bitni datumi

- **početak decembra** - Konferencija (završni ispit) - prezentacija semestralnih radova
- **Februar 2026**. - IT Žabljak međunarodna konferencija

Semestralni zadatak

- Projekat sa fokusom na HPC (High Performance Computing) i AI
- Teme: istražite Strategiju pametne specijalizacije (S3 oblasti), SDG (Ciljevi socijalnog razvoja), aktuelne lokalne teme; ono što je VAMA ZANIMLJIVO

Tips&Tricks

- Mislite da ne umijete da programirate - koristite AI (pametno)
- Budite realni - koliko posla stvarno mogu da završim za vrijeme trajanja semestra?
- Ne uzimajte previše ambiciozne projekte - less is more!
- Bolje odraditi prototip pa postepeno proširivati primjenu, funkcionalnosti i sl.
- Ovaj projekat može biti dobra podloga za diplomski rad

Tips&Tricks pt. II

- Istražite različite AI alate za pisanje koda, ne samo ChatGPT (npr. Cursor, GitHub copilot, Perplexity,Claude...)
- Naučite da pišete dobre promptove
- Nije nužno znati da napišete kod, ali je neophodno da razumijete njegovu strukturu, kao i kako funkcioniše aplikacija koju ste napravili
- Pokušajte da prepoznate problem u Vašem okruženju i probajte da ga riješite upotrebom AI i HPC

Konferencija

28th International Conference on Information Technology (IT)
Žabljak, 21 – 24 February 2024

AI and Computer Vision in Cultural Heritage Preservation

Jovana Mitric, Igor Radulovic, Tomo Popovic, *Senior Member, IEEE*, Zoja Scekic, Sandra Tinaj

***Abstract*— In the recent years, rapid advances in technology, especially in Artificial Intelligence (AI) and Machine Learning (ML), have impacted the way economy functions, as well as society at large. The integration of these technologies in tourism plays a significant role in cultural heritage preservation. This research explores the intersection of artificial intelligence, cultural heritage, and tourism, with a focus on Montenegro's efforts to leverage digital transformation for tourism development. Many monuments are not marked and there is no background information about their historical significance. With four UNESCO World Heritage sites, Montenegro is recognized as country with high touristic potential and rich cultural heritage, which implies that implementation of AI technologies can preserve forgotten monuments and give them a new life, as well as enhance the overall touristic experience and position Montenegro at the forefront of international touristic landscape. Using a well-known framework Flask, we developed web application that allows users to take images of a monument, upload it to our web application and after a few seconds, they get annotated image of a recognized monument, along with a text containing more information about the said monument.**

***Keywords*— artificial intelligence, computer vision; cultural heritage preservation; machine learning; medieval tombstones**

I. Introduction

People were always fascinated by the question of intelligence and it was a subject of many researches over the past few centuries. It was not until 1955, when John McCarthy, American mathematician and computer scientist, introduced the term Artificial Intelligence (AI) [1]. The birth of AI as a research discipline is considered the Dartmouth Summer Research Project of 1956, organized by John McCarthy himself, along with his colleagues [2]. Today, only 67 years later, artificial intelligence is everywhere around us and we use it for our daily tasks. The rapid pace at which the technology is advancing is fascinating, making even Moore's law inapplicable in the context of modern technology. All of this is feeding into Y. N. Harari's idea of dataism – religion of data as a new religion that we are all believers of, highlighted in his book Homo Deus [3]. In recent years, as AI and machine learning are becoming more powerful and practically useful, different applications of AI in cultural heritage preservation have been proposed [4-6].

There is a strong link between technology, science and what we call cultural heritage. This relationship is not focused only on preservation of cultural heritage, but also it makes a great foundation for inventing new methodologies and techniques that enable further research of traditional disciplines related to cultural heritage [7]. Cultural heritage plays an important role in development of tourism. Some destinations base their touristic offer solely on cultural heritage, or it makes the majority of the offer. Therefore, a special form of tourism is developed, named heritage tourism [7]. Heritage is defined as something we inherit from the past and use as a resource for tourism, education and community development. Cultural history of a country plays a fundamental part of nation's identity, and thus it is important that cultural heritage is represented accurately and that it is available for tourists to explore as a part of their experience. Cultural heritage is integral to global tourism system, with many destinations showcasing art, culture and built patrimony as main parts of their tourist experience. There are new opportunities for AI applications in the context of cultural heritage, but not without the complex challenges [8].

In this paper, we will focus on the use of AI and computer vision and explore the way how a system for recognising monuments and tombstones could be recognised and potentially integrated into digital solutions for tourism. In the paper, we are describing a proof-of-concept of a web application capable to support execution of a computer vision prediction model and serve as a platform for further research and development.

II. Background

A. Montenegro – recognizing tourism potential

Montenegro, a country with rich natural and cultural heritage, recognizes the need for digital transformation in the domain of tourism. "Strategy of Smart Specialization" is an official document issued by the government of Montenegro in 2019 that recognizes development priorities, among which is tourism as a vertical priority and Information Communication Technologies (ICTs) as a horizontal priority that has an impact on tourism [9]. Additionally, "Strategy for

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DIPLOMSKI RAD

Mentor: prof. Dr Tomo Popović

Student: Jovana Mitrić

Broj dosijea: 21/021

Podgorica, septembar 2024. godine

Primjer projekta

- Problem - veliki broj napuštenih, neobilježenih spomenika kulture, uprkos bogatom kulturnom nasljeđu Crne Gore
- Izrada modela koji prepoznaje spomenike kulture pomoću kompjuterske vizije
- Proof-of-concept projekat

Tehnologija:

- Yolov8 model za detekciju objekata
- Roboflow platforma - za anotaciju podataka i augmentaciju dataseta
- Google Colab platforma za treniranje modela
- Flask framework za izradu korisničkog interfejsa