

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za računalništvo in informatiko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Žiga Emeršič, ziga.emersic@fri.uni-lj.si

3. Raziskovalno področje (Research field):

Biometrija, globoko učenje, računalniški vid

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Raziskovalno delo se osredotoča na razvoj in uporabo globokih modelov na področju biometrije, pri čemer vključuje tudi generatorske modele. Cilj je raziskati napredne metode za analizo in sintezo biometričnih podatkov, kot so obrazi, prstni odtisi in drugi fiziološki ali vedenjski vzorci. Poseben poudarek bo na izboljšanju robustnosti in generalizacije modelov, obravnavi etičnih vidikov ter iskanju optimalnih arhitektur za zagotavljanje visoke natančnosti in varosti. Delo vključuje eksperimentalno validacijo na različnih zbirkah podatkov ter razvoj novih pristopov za generiranje in manipulacijo sintetičnih biometričnih vzorcev.

Eng.: The research focuses on the development and application of deep models in biometrics, including generative models. The objective is to explore advanced methods for analyzing and synthesizing biometric data, such as facial features, fingerprints, and other physiological or behavioral patterns. Special emphasis will be placed on enhancing model robustness and generalization, addressing ethical considerations, and optimizing architectures for high accuracy and security. The work will include experimental validation on various datasets and the development of novel approaches for generating and manipulating synthetic biometric samples.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

diplomska listina/potrdilo o zaključku študijskega programa (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

priloga k diplomi/ potrdilo o opravljenih obveznostih (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)

potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)

nagrade (awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))

bibliografija (bibliography)

opis dosedanjega sodelovanja pri raziskovalnem delu (description of the candidate's research work)

osnutek idejne zasnove raziskovalnega dela (preliminary research proposal)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za računalništvo in informatiko

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Vida Groznik vida.groznik@fri.uni-lj.si

3. Raziskovalno področje (Research field):

Umetna inteligenca

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Razložljiva umetna inteligenca in negotovost v multimodalnih medicinskih odločitvenih sistemih

Umetna inteligenca (UI) vse bolj spreminja zdravstveno obravnavo, a njena uporaba pri napovedovanju nevrodegenerativnih bolezni, kot sta Alzheimerjeva in Parkinsonova bolezen, ostaja omejena. Razlogi za to so med drugim negotovost, variabilnost podatkov in razlike med zdravstvenimi ustanovami. Modeli, razviti na enem naboru podatkov, pogosto ne dosegajo enake natančnosti v različnih bolnišnicah, saj se podatki razlikujejo glede na demografske značilnosti pacientov, uporabljenih medicinskih pripomočkov in protokole zbiranja podatkov. Namen raziskovalnega dela bo preučiti in razviti razložljive modele UI, ki se bodo lahko prilagodili tem izzivom in hkrati združevali večmodalne podatke (npr. slike MRI, genetske markerje in klinične podatke) za boljše napovedovanje bolezni in podpora pri odločanju.

Raziskovalno delo se bo osredotočilo tudi na prepoznavanje ključnih točk napredovanja bolezni, ko se simptomi nenadoma poslabšajo. S pomočjo grafovskih pristopov za združevanje podatkov, vzročnega sklepanja in kvantifikacije negotovosti bomo gradili modele UI, ki ne bodo zgolj napovedovali poteka bolezni, temveč tudi zaznavali pristranskosti in spremembe v podatkih ter jih primerno naslavljali. S tem želimo izboljšati zanesljivost, preglednost in splošno uporabnost orodij UI v klinični praksi.

Glede na interese kandidata je možen tudi dogovor o drugačni temi s področja umetne inteligence.

Eng.:

Explainable Artificial Intelligence and Uncertainty in Multi-Modal Medical Decision Systems

Artificial Intelligence (AI) is revolutionising healthcare, but its use in predicting neurodegenerative diseases like Alzheimer's and Parkinson's is hindered by uncertainty, data variability, and distribution shifts. Models trained on one dataset often struggle to generalise across different hospitals due to differences in patient demographics, medical equipment, and data collection protocols. This research aims to research and develop explainable AI models that can adapt to these challenges while integrating multi-modal data—such as MRI scans, genetic markers, and clinical assessments—to improve disease prediction and decision support.

A key focus will be on identifying critical disease progression points, where symptoms rapidly worsen. By using graph-based data fusion, causal inference, and uncertainty quantification, this project will develop AI models that not only predict disease trajectories but also detect and adjust for distribution shifts and biases. By ensuring robustness across different clinical environments, the research will enhance trust, transparency, and generalisability, making AI-driven tools more reliable for clinicians.

Depending on the candidate's interests, it is also possible to agree on a different topic within the field of artificial intelligence.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

diplomska listina/potrdilo o zaključku študijskega programa (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

priloga k diplomi/ potrdilo o opravljenih obveznostih (*official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme*)

potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij (*official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme*)

nagrade (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)

bibliografija (*bibliography*)

življenjepis (*CV*)

motivacijsko pismo (*motivation letter*)

opis dosedanjega sodelovanja pri raziskovalnem delu (*description of the candidate's research work*)

osnutek idejne zasnove raziskovalnega dela (*preliminary research proposal*)

priporočilno pismo (*letter of recommendation*)

druge priloge (*other attachments*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za računalništvo in informatiko, Univerza v Ljubljani

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Matej Kristan, matej.kristan@fri.uni-lj.si

3. Raziskovalno področje (Research field):

Računalniški vid [ENG: Computer vision]

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.:

Mladi raziskovalec bo delal na področju metod računalniškega vida, specifično na tematiki detekcije objektov z malo učnimi primeri. Gre za eno od trenutno izjemno aktivnih področji, ki se primarno tičejo analize slik, možno pa jih je razširiti na videoposnetke. Mladi raziskovalec se bo primarno ukvarjal z razvojem mehanizmov za učinkovito učenje v testnem režimu ter z razvojem računsko in memorijsko učinkovitih arhitektur. Po potrebi bo izdelal ustrezne podatkovne zbirke za preverjanje specifičnih lastnosti razvitih in konkurenčnih metod. Od raziskovalca se pričakuje skrbnost ter sposobnost reševanja raziskovalnih problemov na področju računalniškega vida. Zaželeno je, da ima kandidat že izkušnje z znanstvenim objavljanjem rezultatov raziskav na področju računalniškega vida.

Kandidat mora izpolnjevati naslednje pogoje:

- Magisterij iz tehničnega programa (preferira se Računalništvo in informatika),
- predhodne izkušnje z modernimi metodami računalniškega vida,
- dobre veščine programiranja,
- dobra sposobnost strokovnega komuniciranja,
- dobro znanje angleškega jezika.

Eng.:

The young researcher will work in the field of computer vision methods, specifically on the topic of low-shot object detection. This is one of the currently highly active research areas, primarily addressing analysis of individual images, but with the potential to be extended to videos. The young researcher will be primarily concerned with the development of mechanisms for efficient test-time learning, and with the development of computationally and memory efficient architectures. They will, where appropriate, create appropriate benchmarks to validate the specific properties of the developed and competing methods. The researcher is expected to be diligent and capable of solving research problems in the field of computer vision. It is desirable for the candidate to already have experience in scientific publishing of research results in the field of computer vision.

The candidate is required to fulfil the following criteria:

- Master's degree from a technical program (preferred Computer science),
- prior experience with modern computer vision methods,
- good programming skills,
- good ability for professional communication,
- good proficiency in the English language.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

diplomska listina/potrdilo o zaključku študijskega programa (*diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme*)

nagrade (*awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award)*)

bibliografija (*bibliography*)

življenjepis (*CV*)

opis dosedanjega sodelovanja pri raziskovalnem delu (*description of the candidate's research work*)

Opis raziskovalnega dela (Research work description)

1. Članica UL (UL member):

Fakulteta za računalništvo in informatiko (Faculty of Computer and Information Science)

2. Ime, priimek in elektronski naslov mentorja/ice (Mentor's name, surname and email):

Marko Robnik-Šikonja, marko.robnik@fri.uni-lj.si

3. Raziskovalno področje (Research field):

6.05.00, Humanistika, Jezikoslovje
2.07.00, Tehnika, Računalništvo in informatika

4. Opis raziskovalnega dela (Research work description):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce (It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.).

Slov.: Raziskovalno delo v okviru doktorske teme bo potekalo na področju semantike, specifično na področju leksikologije in leksikografskega opisa slovenskega jezika, v povezavi s sodobnimi jezikovnimi tehnologijami in umetno inteligenco. Širši cilj raziskave je napredek pri razumevanju človeške in strojne interpretacije kontekstualiziranih pomenskih podatkov, kot jih najdemo v različnih besedilnih korpusih slovenskega jezika, v povezavi s podatki v referenčnih semantičnih virih za slovenski jezik (digitalna slovarska baza za slovenščino, slovenski WordNet ipd.) ter v večjezičnih virih, ki vsebujejo slovenski jezik (npr. BabelNet, ConceptNet, Wikidata). Ožji cilj raziskave je izboljšanje podatkov v obstoječih ali novih jezikovnih virih, ki vsebujejo različne tipe semantičnih informacij o slovenskem jeziku, in orodij za njihovo izdelavo ali uporabo.

Eng.: The research work within the doctoral thesis will focus on the field of semantics, specifically in the area of lexicology and the lexicographic description of the Slovene language, in connection with modern language technologies and artificial intelligence. The broader aim of the research is to advance the understanding of both human and machine interpretation of contextualized semantic data, as found in various text corpora of the Slovene language, in relation to data in reference semantic resources for Slovene (such as the Digital Dictionary Database for Slovene, Slovene WordNet, etc.), as well as in multilingual resources that include Slovene (e.g., BabelNet, ConceptNet, Wikidata). The more specific goal of the research is to improve the data in existing or newly developed language resources that contain different types of semantic information about Slovene, as well as tools for their creation or use.

5. Priloge, ki jih kandidat priloži k prijavi (Documents that the candidate submits with the application):

diplomska listina/potrdilo o zaključku študijskega programa (diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)

priloga k diplomii/ potrdilo o opravljenih obveznostih (official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)

potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij (official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)

nagrade (awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))

bibliografija (bibliography)

življenjepis (CV)

motivacijsko pismo (motivation letter)

opis dosedanjega sodelovanja pri raziskovalnem delu (description of the candidate's research work)

osnutek idejne zasnove raziskovalnega dela (*preliminary research proposal*)

priporočilno pismo (*letter of recommendation*)

druge priloge (*other attachments*)