Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*

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*):

Aleksander Sadikov; aleksander.sadikov@fri.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.07.07 Inteligentni sistemi - programska oprema *(Intelligent Systems – software)* Dodatno *(additionally)*: 7.02 Interdisciplinarne raziskave *(Interdisciplinary research)*

4. Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*:
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo: Laboratorij za umetno inteligenco (LUI) je aktiven na različnih področjih umetne inteligence (UI), tako temeljnih kot aplikativnih. Usposabljanje mladega raziskovalca (MR) bo povezano z umetno inteligenco, ožjo tematiko pa bomo definirali skupaj (primer je opisan spodaj). LUI je povezan, interdisciplinaren in mednaroden kolektiv, ki aktivno spodbuja mednarodno sodelovanje. Letos smo npr. organizirali prvo izvedbo Evropske poletne šole umetne inteligence ESSAI & ACAI 2023 (https://essai.si) z več kot 60 predavatelji s prestižnih univerz in podjetij ter več kot 600 udeleženci. V tem duhu bomo kandidatu omogočili obiske naših partnerjev in spodbujali aktivno udeleževanje mednarodnih konferenc, kot so npr. European Confernce on AI, IJCAI, Artificial Intelligence in Medicine ipd. V LUI je ena izmed raziskovalnih usmeritev uporaba pristopov UI na področju medicine. Pri tem se osredotočamo predvsem na kronične bolezni, kot so npr. nevrodegenerativne bolezni, rak, psihiatrične bolezni ipd. Pri teh boleznih je zgodnja detekcija in nato tudi učinkovito spremljanje in (samo-) nadzor bolezni zelo pomemben. V realnem okolju specialisti pogosto nimajo možnosti rednega spremljanja bolnika v želeni oz. potrebni meri, kar lahko pripelje do hitrejšega napredka bolezni. Uporaba moderne IKT (kar vključuje tudi uporabo različnih senzorjev) v povezavi z UI lahko zelo pripomore pri presejanju, zgodnjem odkrivanju, objektivnem spremljanju in nadzoru bolezni. To posledično pomeni zmanjšanje stroškov zdravljenja in boljšo kvaliteto življenja bolnikov. Tako npr. v okviru Marie Curie projekta PARENT (https://parenth2020.com) dva naša doktorska študenta raziskujeta možnost uporabe UI in novih biomarkerjev za zgodnje zaznavanje kognitivnih in motoričnih problemov pri prezgodaj rojenih otrocih. Pri implementaciji metod UI pa ni pomemben zgolj tehnični vidik le-teh ampak je potrebno

zagotoviti, da bodo uporabniki (zdravniki, bolniki) zaupali v njeno delovanje tako s tehničnega kot tudi z vidika varovanja zasebnosti in etičnosti uporabe njihovih podatkov. V tem pogledu bo dodaten poudarek na t.i. zaupanja vredni umetni inteligenci (*trustworthy AI)* kot tudi na razložljivi umetni inteligenci *(explainable AI – XAI)*. Na to temo v LUI v letošnjem letu začenjamo tudi nov evropski projekt »MAIBAI: Developing a Metrological framework for Assessment of Image-Based Artificial Intelligence systems for disease detection«.

Raziskovalno sodelujemo z vrsto domačih in tujih raziskovalnih organizacij (UKC Ljubljana, Belgija: KU Leuven, Avstralija: UNSW, RMIT, Nemčija: Charité Berlin, Nizozemska: Radboud UMC, Italija: Politecnico di Torino, Universita di Pavia, Španija: Universidad de Cádiz, INIBICA, Švedska: Örebro University, idr.), kar bo kandidatu omogočilo mednarodno sodelovanje in delovanje.

Od kandidata se pričakuje odlično znanje angleškega jezika, poznavanje metod strojnega učenja, znanje razvoja programske opreme, sposobnost samostojnega organiziranja dela ter natančnost in doslednost.

eng:
Artificial Intelligence Laboratory (AILab) is active in various fields of artificial intelligence (AI), both basic and applied. Young researcher's training will be in the field of artificial intelligence, and we will define the exact topic together (an example is described below). LUI is a friendly, interdisciplinary, and international collective that actively promotes international cooperation. This year, for example, we organised the first European Summer School on Artificial Intelligence ESSAI & ACAI 2023 (https://essai.si) with more than 60 lecturers from prestigious universities and companies and more than 600 participants. In this spirit, we will enable the candidate to visit our partners and encourage active participation at international conferences, such as European Conference on AI, IJCAI, Artificial Intelligence in Medicine, etc.

The use of AI approaches in the field of medicine is one of the primary research directions of the Artificial Intelligence Laboratory. We focus mainly on chronic diseases, such as neurodegenerative diseases, cancer, psychiatric diseases, etc. For these diseases, early detection and effective monitoring and (self-)control of the disease is very important. In the real world, specialists often do not have the opportunity to regularly monitor the patient to the desired or necessary extent, which can lead to faster disease progression. The use of modern ICT (which also includes the use of various sensors) in conjunction with AI can be of great help for screening, early detection, objective monitoring, and control of the disease. This in turn means reduced treatment costs and a better quality of life for patients. For example, as part of the Marie Curie project PARENT (https://parenth2020.com), two of our PhD students are investigating the possibility of using AI and new biomarkers for the early detection of cognitive and motor problems in prematurely born children.

When implementing AI methods, the technical side is not the only important aspect; it is also necessary to ensure that users (doctors, patients) will trust in the solution both from the technical perspective and from the privacy protection and ethics point of view. In this regard, the emphasis will be on the trustworthy AI paradigm as well as on explainable artificial intelligence (XAI) methods. On this topic, in autumn 2023, we are starting a new European project »MAIBAI: Developing a Metrological framework for Assessment of Image-Based Artificial Intelligence systems for disease detection«.

We cooperate with a number of national and foreign research organisations (UKC Ljubljana,

Belgium: KU Leuven, Australia: UNSW, RMIT, Germany: Charité Berlin, Netherlands: Radboud UMC, Italy: Politecnico di Torino, Universita di Pavia, Spain: Universidad de Cádiz, INIBICA, Sweden: Örebro University, etc.), which will enable the candidate international cooperation.

The candidate is expected to have excellent knowledge of English language, knowledge of machine learning methods, knowledge of software development, the ability to independently organise work and high level of motivation and consistency.