Research Project

Application of artificial Intelligence techniques to the development of an adaptive and collective intelligent cognitive training system

This research activity is part of the international swift research project (Adaptive and collective intelligent web-based training to enhance problem-solving in older people https://dpg.unipd.it/progetto-swift) funded by Velux Stiftung which aims to develop a new intelligent web-based training where healthy older adults will be engaged with real-life scenarios such as planning a trip to Rome. In the first part of this project we developed a first prototype of the swift cognitive training system that need to be improved to carry out the planned validation experiment.

The candidate will be expected to conduct scientific research collaborating with the international swift multidisciplinary research team, which includes psychologists, web designers, computer scientists and AI experts. The main goals are to improve adaptability and collective functionalities of the current system exploiting AI techniques. Other activities will concern the refinement of the current system also including multilanguage support, and re-engineering of some of its modules. Moreover, the candidate will be involved in the experimentation, providing when necessary technical support.

The design and implementation of novel training tasks requires a coordinated multidisciplinary research effort. On the one hand, complex technical solutions are needed, for example, to adapt to the difficulty of performing exercises using artificial intelligence or exploiting automated planning and machine learning techniques for the exercises. On the other hand, the supervision of cognitive psychologists is fundamental. Testing with subjects is essential for tuning tasks before delivering them. Personalization and adaptability are issues that require consideration for older subjects. Indeed, the reduced plasticity in ageing requires a higher level of customization and adaptability.

The main milestone of this research activity will be the delivering of the training system that will be used in the validation study.

Plan of activities:

The candidate will be involved in the development and experimentation of the SWIFT web-based cognitive training platform that will be used in the validation study in the context of the swift international research project (Adaptive and collective intelligent web-based training to enhance problem-solving in older people https://dpg.unipd.it/progetto-swift).

The main research activities will include:

- exploiting machine learning and automated planning techniques to improve adaptability and collective functionalities of the training tasks.
- refinement and re-engineering of some of the modules of the system, when required.
- supporting subjects and psychologists involved in the project during the validation experiments, providing technical support.

Preferred requirements include: a PHD in computer science and engineering, and the knowledge of the following technologies: Java programming techniques, Artificial Intelligence techniques like machine learning and automated planning, and experience in the development of web-based applications. Specific experience in the development of cognitive training systems will be also considered.
This 15 months fellowship could be extended for several months in order to complete the project activities.

Piano delle attività:

Il candidato sarà coinvolto nello sviluppo e nella sperimentazione della piattaforma basata su web denominata SWIFT nel contesto del progetto di ricerca internazionale multidisciplinare SWIFT (Adaptive and collective intelligent web-based training to enhance problem-solving in older people https://dpg.unipd.it/progetto-swift).

Gli aspetti principali di questa attività di ricerca riguarderanno:

- l’utilizzo di tecnologie di intelligenza artificiale come machine learning e automated planning per migliorare l'adattabilità degli esercizi di training ed il supporto a sessioni di training collettive.
- Il raffinamento e la re-ingenierizzazione di alcuni moduli del sistema, quando questo sarà necessario.
- Il coinvolgimento nell'attività di sperimentazione fornendo supporto tecnico ai soggetti che svolgono il training ed agli psicologi del team di ricerca.

Requisiti preferenziali sono un dottorato di ricerca (PHD) in Informatica o Ingegneria Informatica. È inoltre richiesta la conoscenza delle seguenti tecnologie: programmazione in Java, tecniche di intelligenza artificiale come machine learning e automated planning, ed esperienza nello sviluppo di applicazioni web.
Verrà inoltre considerata l’eventuale esperienza specifica nello sviluppo di sistemi per il training cognitivo.
L’assegno di ricerca di 15 mesi può essere prorogato per diversi mesi al il fine di portare a termine le attività previste per il progetto.