Research Project

Advanced cognitive training systems for the elderly

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 the swift cognitive training system which is now used in the validation experiment.
The design and implementation of advanced 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 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 realization of new tasks, the analysis of the current system, and re-engineering of some of its modules. Moreover, the candidate will be involved in the experimentation and in the analysis of data, also providing technical support to phycologists and participates when necessary

Plan of activities:

The candidate will be involved in the development of the SWIFT web-based cognitive training platform 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.
- implementation of new advanced 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, for the analysis of data also 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.

Piano delle attività:

Il candidato sarà coinvolto nello sviluppo 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.
- L’implementazione di nuovi esercizi di training.
- Il raffinamento e la re-ingenierizzazione di alcuni moduli del sistema, quando questo sarà necessario.
- Il coinvolgimento nell'attività di sperimentazione e all’analisi dei dati 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.