

Elia – your intelligent personal assistant for language learning

BACKGROUND

Nowadays, language learners increasingly use their non-native languages through digital media. These new digital contexts and practices not only represent a valuable resource for language learning but also reflect the new needs of language learners. Thus there is a pressing need to create language-learning solutions in these emerging contexts of language learners. Not only could it meet the individual intrinsic needs of learners, but also contribute to their lifelong learning.

This ongoing project attempts to design, develop and evaluate an intelligent personal assistant Elia which could support learners while reading or writing in a foreign language online and subsequently create a learning plan from the online content they engage with on a daily basis to enhance their language skills. Elia takes the form of two interconnected parts, a browser plugin and a mobile app, both interacting with the learner and any digital content of choice.

The main function of the browser plugin is not only to provide real-time individualized assistance in reading and writing in the target language by responding to the learner's immediate needs and problems, but also by proactively drawing the learner's attention to the most useful language expressions given the learner's long-term goals. Additionally, the browser plugin's task is to monitor the learner's interactions and map it to the learning process. This is achieved by using state-of-the-art natural language processing and machine learning methods.

On the other hand, the mobile app primarily aims to provide additional learning opportunities in the form of various tasks and exercises. These are based on the long-term learning objectives and previous experience of the learner and are constructed to map the incremental learning process to increase efficiency. Similarly, as the browser plugin, it continuously tracks the learner's performance in order to evaluate the progress and adapt the learning plan. Similarly, this is achieved by using state-of-the-art data analytics and machine learning methods.

TASKS

The nature of this project is highly interdisciplinary entailing a wide range of mini goals and tasks in the areas of linguistics, psychology, didactics, natural language processing (NLP), machine learning, data analytics, software engineering, among others. Below is a brief overview of possible technical tasks divided into three categories:

Language Data Processing

- Information extraction and corpus analysis using **NLP** methods
- Automatic text genre and complexity identification using **machine learning**
- Automatic text readability (=difficulty) evaluation using **machine learning**
- Automatic lexical substitution and text simplification using **machine learning**
- Automatic question and distractors generation using **machine learning**
- Automatic error detection and correction using **machine learning**
- Automated writing evaluation (AWE) using **machine learning**

Software Engineering

- Graph-based **Neo4j** DB language knowledge modeling
- Developing backend using **Django** framework, deploying AI in **AWS**, writing tests, integrating **REST** services, automating **DevOps**
- Developing front-end mobile application in **Swift** or **Flutter** (Google new open source technology)
- Developing Chrome/Firefox browser plugin frontend UX/UI in **Javascript, HTML & CSS**

Learning Data Analytics

- Creating a tracking model of logging learner activities using **xAPI**
- Knowledge prediction and modeling using **machine learning**
- Analytics of network structures (actor-artefact interactions) using **network algorithms**
- Analytics of learning processes using **sequential mining algorithms**
- Creating learning dashboards using **data visualisation** tools
- Building a learning item recommendation system using **collaborative filtering**

MILESTONES

Introductory phase

- Introduction to the whole project (including team)
- Selection of an area of interest from the above listed tasks
- Setting realistic assignment(s) in line with the area of interest

Pre-study phase

- Reading recommended literature related to the assignment(s)
- Attending one-to-one sessions with team members to discuss and exchange ideas
- Drafting a concrete plan for the execution phase

Execution phase

- Carrying out the plan partly individually and partly in a team
- Documenting the work and sending bi-weekly status mails
- Attending regular team meetings

Final phase

- Completing and submitting the assignment
- Writing a final report
- Review of the work by the team at a final team meeting

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