SUSTAIN-ALL LANGUAGE LEARNING

Complete Research, Research in Progress

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1   Introduction

The enetCollect COST (European Cooperation in Science and Technology of the European Commission) action addresses the major European challenge of fostering the language skills of all citizens regardless of their diversified social, educational, and linguistic backgrounds. To this end, the Action is concerned with the domain of Language Learning and focuses on enhancing the production of learning material in order to cope with the increasing demand for language learning and the striking diversification of learner profiles.

EnetCollect addresses this challenge by performing the groundwork to set into motion a Research and Innovation trend combining the well-established domain of Language Learning with recent and successful crowdsourcing approaches in order to unlock a crowdsourcing potential available for all languages and trigger an innovation breakthrough for the production of language learning material. EnetCollect approaches this objective by building an international and interdisciplinary R&I community, creating a comprehensive theoretical framework and running prototypical experiments.

EnetCollect also aims at simultaneously crowdsourcing language learning material and language-related datasets in order to attract language-related Research and Innovation players.

Such an IS has to integrate the following features:

- edutainment
- gamification
- Computer Assisted Language Learning (CALL)
- Individual Customization

We describe here a very important IS for Language Learning – a pan-European network of story-based distributed crowdsourcing intelligent knowledge base for language learning – SUSTAIN-ALL.

Furthermore, we provide insights on how such an IS could be implemented by using already deployed Games With A Purpose like Knowledge Coder (Rodosthenous & Michael, 2014) or its successor Robot Trainer (Rodosthenous & Michael, 2016).

2   Gamified Crowdsourcing AI Language Learning IS (G-CALL-IS)

G-CALL-IS – Gamified Crowdsourcing AI Language Learning Information System is a network architecture of servers, knowledge bases, linguists, educator experts, content providers, teachers and prosumers (the student being both producer and consumer) of learning material.

G-CALL-IS integrates into one extremely powerful Information System the major tools and most useful methods of:

- Gamifying
- Crowdsourcing
- AI
- Language Learning educational and linguistic Knowledge
- Web 2.0

G-CALL-IS - Gamified Crowdsourcing AI Language Learning IS is the holy grail of current R&D. It includes both intelligent architecture and intelligent life-cycle (Rosenberg & Zviel-Girshin, 2003).

3   SUSTAIN-ALL

SUSTAIN-ALL - from Story Understanding to Story Telling AI Network of All-European Language Learning is G-CALL-IS that is story oriented.

Story is central to language learning. It makes it better and more interesting. No language learning can be complete without story understanding and storytelling in L2 (Lucarevschi, 2016; Isbellet al., 2004). Even for L1 it could improve user's knowledge. And story can become a very good basis for production of learning material. Creating stories for language learning would be an extremely fruitful endeavor.

Architecture for creating, analysing and improving database of stories (especially in a computer readable form and including meta data) would dramatically enhance production of learning material for language learning. Such architecture is presented here – the G-CALL enetCollect playground.

Story games suite of the G-CALL playground would include, among other:

- story understanding in L1
- storytelling in L1
- story understanding in L2
- storytelling in L2

In addition to the immediate advantages of learning by the users, the added value includes such important achievements as:

- models of the users
- model of clusters of users
- database creation of learning content

- human and computer readability

- creating human and computer readable database of learning content of stories

- immediate processing by AI tools such as Prolog

- user-teacher and user-learner real time online collaboration

- syntactic and semantic knowledge crowdsourcing in L1 and L2

Knowledge Coder is a game implementing the SUSTAIN-ALL principles and with some modifications in the game mechanisms, it can help towards gathering stories and story related information in any language. It can also be used to annotate stories. The game is available online at (https://cognition.ouc.ac.cy/knowledge_coder) thus creating the first exemplification and embodiment of the SUSTAIN-ALL network.

4   Knowledge Coder - A Game With A Purpose

Knowledge Coder is a Game With A Purpose (GWAP) designed to facilitate experiments on knowledge acquisition using crowdsourcing techniques. The General research problem this game tries to tackle is that of the acquisition of Background Knowledge to be used by an automated story understanding system. The approach taken is to develop a method/system to facilitate knowledge acquisition using crowdsourcing techniques. More specifically, this game uses a specific methodology that breaks the knowledge acquisition task into a sequence of more specific tasks, so that human participants not only identify relevant knowledge, but also convert it into a machine-readable form, generalize it, and evaluate its appropriateness.

The games use the output-agreement games template, that requires players to agree on the same output they produce. The game plot takes place in the near future, where Planet Earth is captured by alien forces capable of intercepting human communications in natural language. Players are asked to join the resistance forces and help their co-defenders encode human knowledge in a form that is not readable by aliens, and thus guard it from being intercepted.

Players are encouraged to play using competitive motives. For each successful mission attempt, players are rewarded with points that are added to their total score. Players are also rewarded with extra points when other players contribute and verify the former players' mission results and vice versa. These extra points are used to separate the knowledgeable and honest players from the rest. After a player reaches a certain score, an award is issued and added to the player's profile. These methods are commonly applied techniques to encourage and promote competition among players in games.

The developed methodology comprises of six steps, casted as game missions. Detailed description of the game can be found in the work of Rodosthenous and Michael (2014).

5   Conclusions and Future Research

Knowledge Coder is only one of the many approaches that can be used in the SUSTAIN-ALL IS. We need a variety of games and crowdsourcing applications built as G-CALL-IS. The future applications and games will have a very sophisticated network and life-cycle.

We have assembled a great corpus of Story-based English Language Learning (SELL). It has now to become available to all users through online gamification integrated into the SUSTAIN-ALL IS.

Further research will develop AI mechanisms for reading, understanding, creating the stories knowledge base for a better enetCollect content and processes. The ever-evolving knowledge of the individual user will be processed and incorporated into the IS.

The knowledge base of SUSTAIN-ALL IS is to be updated in a significant part by crowdsourcing. Through crowdsourcing the process of understanding, answering comprehension tests questions, analysing, metadata creation and the process of creating the stories will grow the knowledge base. The student will become a prosumer (both producer and consumer, often simultaneously) of the stories and meta-data.

There is a need for a special SUSTAIN-ALL IS life cycle of building and refining the stories knowledge base, the games, model and process constantly to produce an evolving ever improving network.

SUSTAIN-ALL IS will become in the next years a major force for improving dramatically the life and mutual understanding of languages and cultures of Europe.

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