A Platform for Image Recommendation in Foreign Word Learning

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ABSTRACT: This paper introduces a platform for image recommendation that can be used in informal learning of foreign words. The platform is based on a distributional semantics model (DSM) that is designed to recommend Feature-based Context-specific Appropriate Images (FCAIs) for representing a word. This technology is for a context-aware ubiquitous learning system that captures ubiquitous learning logs from various learning scenarios. This paper briefly discusses the data capturing tool, methods of employing learning analytics for ubiquitous learning logs analysis, natural language processing techniques applied for word-bank creation, and image embedding methods employed for feature analysis, development of an algorithm that determines the most appropriate FCAI images, and related scientific issues.

Keywords: Image recommendation, lifelogs analytics, ubiquitous learning, word learning

1   INTRODUCTION

Informal vocabulary learning tools such as duolingo, Rosetta stones, VoLT, Rakuten's lingvist etc. on both web and mobile platforms are gaining much popularity among motivated language learners, particularly those who want to memorize foreign words. One of the technological advancements lack in most of the systems is the recommendation of appropriate images in the right time and right learning context. Unarguably, it is not an easy task because a huge amount of educational big data such as a learner's ethnographic information, study location, time, context, and image information etc. processing is required to determine the most appropriate image to represent a word. The objective of this study is to develop a platform that is capable of recommending Feature-based Context-specific Appropriate Images (FCAIs) (Hasnine et al., 2018) for informal learning of foreign words.

2   THE PLATFORM: ARCHITECTURE AND IMPLIMENTATION PATHWAY

The platform is based on a Distributional Semantics Model (Hasnine, 2018; Hasnine et al., 2018) that-at first quantifies and categorizes the semantic similarities between various educational data. This analysis allows the model to map the relationship between a word and its visual image features, learning context, geographical location, demographic information, time of learning etc. After that, a word's image representation with a reflection of a learner's cultural-association and learning context is analyzed. SCROLL dataset (Ogata et al., 2018) that contains over 1700 foreign language learners' lifelong learning experiences (such as the geolocation information, vocabulary knowledge, quiz, learning context, contextual image information etc.) is analyzed using lifelog analytics. For the analysis, three kinds of educational data are sent to a Learning Record Store (LRS) as xAPI (Experience

API) statements, are as follows: **Profile data,** the profile metrics consists of word, learner's demographic, culture-specific information, time, place, past knowledge level, and image information; **Word-bank,** is created that contains words labeled as noun, adjectives, sentences, phrases etc. by using Mecab and TreeTagger, two NLP-based tools for Parts of Speech (POS) analysis for English and Japan languages, respectively; **Images,** the Inception v3, VGG16, VGG19, and DeepLoc deep architectures are employed for extracting various deep learning features from images. The image sources are SCROLL system, AIVAS image datasets, and Google image search engine. Finally, using AIVAS-IRA algorithms (Hasnine et al., 2016; Hasnine, Ishikawa, Hirai, Miyakoda, & Kaneko, 2017), the most appropriate image(s) to represent a word's most appropriate representative image under a specific learning location and context. Fig.1. displays the architecture of the platform.
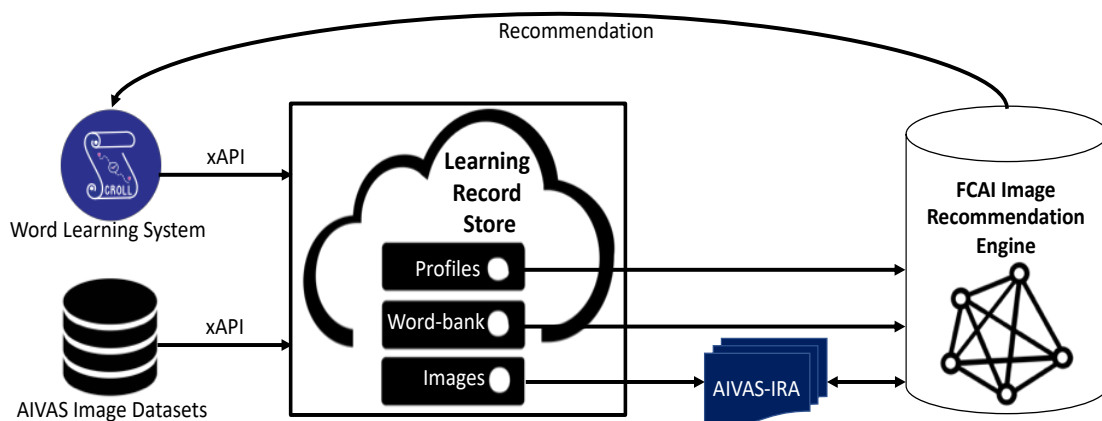

Figure 1. The Architecture of the Platform

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