What is a Modern Arabic Dictionary?

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Abstract

A major concern our research addresses is how to enhance the children's use of the Arabic dictionary to encourage them to independently learn more vocabulary. Even though the first Arabic dictionary was developed almost 1500 years ago, the state of the art in Arabic dictionaries has not made much progress and falls far behind dictionaries for other languages. We propose a framework for building dictionaries that are game-like in their level of interactivity, and thus provide an immersive environment for children to enthusiastically explore more concepts, images, and vocabulary.

1. Introduction

There is a consensus that Arabic dictionaries, whether printed or electronic are not user-friendly. Rather than being tools for learning, they are a hindrance. Their complexity and their presentations are not conducive to learning. Consequently, their impact on vocabulary acquisition, even though not formally assessed, is highly negative. Our emphasis is on how to enhance the children's skills to facilitate their vocabulary acquisition, and consequently, enrich their vocabulary.

In our view of a modern dictionary, we take a radical departure from the prevailing trends that emphasize the lexicon: our thesis is that the two major features of such a dictionary are: external presentation (interactivity) and internal representation (conceptual mapping). The lexicon does not matter. To this end, we propose a framework for building dictionaries that are game-like in their level of interactivity, and thus provide an immersive environment for children to enthusiastically explore more concepts, images, and vocabulary. The following four features provide the foundation for achieving this goal:

- Immersive: the child is induced to become a member of the context, thus becoming physically and emotionally involved.
- Interactive: the child becomes an active player, engaging in actions, exploration to reveal the elements of the universe.
- Transparent interface: the child sees only the environment and context that she is exploring, that is, only a minimal interaction of controls is needed to perform tasks.
- Conceptual map: the exploration is structured according to a set of concepts that captures the child's universe.

2. Previous work

It could be said that the major breakthrough on Arabic dictionaries was done by Al-Khaleel [8] in the eighth century. Following him were Ibn Duraid, Al Jawhari, Al Azhari, Ibn Fares, and Ibn Sida who provided various perspectives and improvements. One could not fathom the high intellect and deep commitment of these linguists. Since then, the subsequent dictionaries have been just mediocre attempts at copying previous works. Today, the printed Arabic dictionary provides a low quality, a poor presentation, a disorganized structure, and an unscientific approach. A cursory browsing of Arabic dictionaries on the library shelves highlights these deficiencies. Other attempts by foreign publishers trying to provide bilingual dictionaries constitute purely commercial operations devoid of any Arabic context, that is, they are word translations of foreign dictionaries. Recently, electronic versions of Arabic dictionaries are being deployed on the Internet. Except
for the still-in-progress work of [6], most online dictionaries are just electronic versions of the printed text. Their only advantage is the search feature. Even this added feature is limited by its simplistic morphological analysis. A comparative analysis of Arabic and foreign dictionaries reported in [3] confirms our observations.

3. Methodology

Our approach consisted of several stages:

- Children vocabulary analysis based on primary school textbooks: This task allowed us to identify some of the issues associated with the development of children vocabulary based school corpora (ref. to [1] for further details).
- Development of a child-centered ontology.
- Analysis of state-of-the-art online dictionaries.
- Requirements Development.
- Design of a prototype.

3.1 A Child-centered Concept Map

In his Mukhassas, Ibn Sida [7] organized his dictionary according to "books", each of which consisted of a major concept. Thus, we have the "Book of the Creation of Man", the "Book of Garments", the "Book of Food", and so on. Each book is divided into subconcepts that are further elaborated and the related vocabulary is introduced. His organization along themes provides a concept map that is proven to be an effective pedagogical strategy. With the advent of computers and the proliferation of data, various approaches to organizing knowledge have been advocated. An example is the Suggested Upper Merged Ontology (SUMO) [5]. Viewed as small-scale ontologies, concept maps have been shown to help children organize their knowledge and their thinking, and stimulate their cognitive skills [2]. In our approach, we developed a concept map based on the child's universe.

Overlaying this map is a scene that starts with the universe and zooms in on the smaller components of the child's world, such as home, toys, parents, schools, and other interesting elements surrounding the child. The structure of the scene transparently captures linguistic, visual, and relational information about a given theme. Dynamically exploring moving scenes immerses the children in their environment and allows them to construct their own story. Even though our underlying representation is highly structured, the child's exploratory activities are spontaneous and guided by his/her actions and decisions. As reported in [4], interaction and exploration are processes that contribute significantly to the children intellectual development. Figures 1 and 2 illustrate our vision.

3.2 State-of-the-Art Online Dictionaries

Our investigation covered English, French, and Arabic online dictionaries. The selected sample is fairly representative. Our analysis allowed us to identify the prevailing interface features supported by these dictionaries. These features were then used as comparison criteria. Table 1 summarizes the evaluation criteria.
### Table 1: Dictionary Comparison Criteria

<table>
<thead>
<tr>
<th>Features</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word search</td>
<td>Search for an input word.</td>
</tr>
<tr>
<td>Image search</td>
<td>Given an image search for information associated with it.</td>
</tr>
<tr>
<td>Search by categories (Themes)</td>
<td>Search is guided by a selected theme.</td>
</tr>
<tr>
<td>Colored Illustrations</td>
<td>Quality artistic illustrations.</td>
</tr>
<tr>
<td>Detailed diagrams</td>
<td>Diagrams are illustrated at various levels.</td>
</tr>
<tr>
<td>Detailed descriptions</td>
<td>The descriptions of the illustrations are highly detailed.</td>
</tr>
<tr>
<td>Vocabulary-related games</td>
<td>Some simple games associated with vocabulary discovery are available.</td>
</tr>
<tr>
<td>Export tools</td>
<td>Tools to export illustrations and definitions are available.</td>
</tr>
<tr>
<td>External resources</td>
<td>Links to external additional resources are provided.</td>
</tr>
<tr>
<td>Sound (pronunciation)</td>
<td>Pronunciation of words is available.</td>
</tr>
<tr>
<td>Video</td>
<td>Videos to illustrate features are available.</td>
</tr>
<tr>
<td>Thesaurus with (Synonyms, Related Words, Near Antonyms, Antonyms, Opposites)</td>
<td>A thesaurus with various semantic fields is provided.</td>
</tr>
</tbody>
</table>

The Arabic dictionaries did not score that well. Most had only a limited functionality exemplified by the search feature. This led us to qualify them as a mere electronic versions of the printed ones. The English and French dictionaries provided all the features with a pleasant multimedia presentation. However, they still relied on the point-and-click paradigm, thus limiting the level of interactivity.

#### 3.3 System Prototyping

Interactivity is the fundamental and pervasive feature of our framework. To immerse the child into the learning process, we designed an environment in which the learner is an actor capable of exploring new environments by performing various related actions. The child enters his/he universe and from the first step elaborates independently a story that captures the child’s quest for vocabulary discovery. The exploration process is supported by a large number of scenarios. Each scenario consists of sequence of scenes. A scene, that is, a multimedia component, is an object made up of several objects.

![Figure 3: Home Scene](image)

For example, the scene shown in Figure 3 depicts a home (adapted from “My first 1000 words dictionary”). This scene has several thematic sub-scenes (objects), such as furniture, water, hygiene, linens, etc. Each object interacts with the actor through actions associated with the potential behavior of the object. Actions are expressed as properties used to describe the structure and behavior of a given object. Structural properties describe the physical attributes of an object (e.g., height, weight, color, etc.), whereas behavioral properties describe its behavior (e.g., fly, open, move, sing, etc.). Another key feature of interaction is the transition from one scene to another. Rather than being point-and-click, transition is effected by the movements of the player in the scene. Such a conceptualization makes an object a “live partner” capable of exposing itself by responding to the actions of the child.

Our students have so far developed the following products: (1) requirements document (SRS); (2) use-cases; (3) object-oriented design (class diagrams); behavioral design (sequence diagrams); and test case suite [3]. They are currently implementing the system. Another aspect we are investigating is the formalization of the notion of scenario using concepts from automata theory and process algebra. Indeed, we can views scenes as just complex states, transitions as actions, and object behaviors as algebraic processes.

#### 4. Conclusion

We proposed a new framework to enhance the quality and the usefulness of the Arabic dictionary. Our framework provides an immersive environment for the child to acquire new linguistic skills in playful manner. Immersion is supported through a real-life presentation that allows the child to engage in an active exploration...
of the components of this environment. We would say that the child is in fact playing out his/her stories in this universe.

References


