A Web-Based Communication Tool for Arabic-Speaking Newcomers to Canada

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Outline

1. Introduction: Objectives, Motivations and Challenges

2. Web-based Communication Tool

3. Dynamic Multilingual Ontology

4. Conclusion and Future Work
1. Introduction

Facilitate the communication in the two official languages of the host country (En/Fr)

Better share and transmit their opinions, ideas and thoughts

Encourage community engagement

Accelerate newcomers integration, self-reliance and contribution to society

Improve the communication skills in the target language
1. Introduction

1. Dealing with different types of newcomers (education level, socioeconomic background, disability...) and decide on the tool’s features accordingly

2. Development of the tool features
   - Manual (tedious for large number of items) vs automatic (response time, and quality of data)?

3. Fit the communication tool into the daily interactions of newcomers
   - Tool’s usability and understanding

4. Tool’s evaluation
2. Web-based communication tool

Presentation layer
- Dynamic GUI

Application layer
- Dynamic APIs
  - Audio
  - Map
  - Txt to txt
  - Txt to speech
  - Speech to txt
  - Speech to Speech

Data management
- Organize, manage, and maintain data

Data layer
- Arabic Wikipedia articles
- NLP processing
  - Extraction and annotation of items
- Dynamic Multilingual Ontology
2. Web-based communication tool

Objective section
2. Web-based communication tool

Example of items from the 1st level of the multilingual ontology
2. Web-based communication tool

Example of an item

All the buttons are associated with an audio message corresponding to the language
2. Web-based communication tool

2. Click on “Next” to display tips, symptoms, etc.

1. Display information about covid-19

Learn more about COVID-19 in Saskatchewan (Daily case numbers): Click here

Coronavirus is dangerous and can make you get sick

فيروس كورونا خطير ويمكن أن يجعلك مريض

Le coronavirus est dangereux et peut vous rendre malade

2021-07-02
2. Web-based communication tool

Covid-19 item

3. Symptoms with audio messages

Guidance ** إرشادات ** Conseils

In case you have symptoms or tested positive to covid-19, you should stay at home. Also, you should stay at home if someone you live with or someone in your extended household has symptoms. You should isolate yourself if you have been in close contact with someone who has tested positive. Isolation will help to control the spread of the virus to friends, the wider community, and the most vulnerable.

En cas de symptômes ou de résultat positif du COVID-19, vous devez rester chez vous. De plus, vous devriez rester à la maison si une personne avec qui vous vivez avec ou un membre de votre famille élargie développe des symptômes. Vous devriez vous isoler si vous avez été en contact direct avec une personne testée positive pour le virus. L’isolement aidera à contrôler la propagation du virus aux amis et à la communauté plus large et plus vulnérable.

4. Tips with audio messages
2. Web-based communication tool

Text to text translation

Original text

Original language

Target language

Translated text
2. Web-based communication tool

Text to Speech conversion

Use case: to learn words’ pronunciation

Write your text here..

Google Bahasa Indonesia (id-ID)

Listen-استمع-Ecouter

* Write your text and click on the button Listen

* كتب نصك وانقر على الزر استمع

* Écrivez votre texte et cliquez sur le bouton Écouter
2. Web-based communication tool

Speech recognition

Arabic speech to text translation

Recognized Speech

Saved records:
- 17/02/2021, 21:46:23 Play
- Remove

Recorded audio file
2. Web-based communication tool

Speech to speech translation

Choose your native language

Arabic - العربية  English - الإنجليزية  French - الفرنسية

Have your voice message translated

Target language:

ar  en

Translate

Symbol explanation

In order to record your voice, please make sure that you are following the symbols below.

Afin d'enregistrer votre voix, veuillez vous assurer que vous suivez les symboles ci-dessous.

- 🎤: start voice recording  -- إنضم إلى التسجيل الصوتي  -- démarrer l'enregistrement vocal
- 🎙️: stop voice recording  -- سلسلة التسجيل الصوتي  -- arrêter l'enregistrement vocal
- 🎧: listen to translated voice  -- إستمع إلى الصوت المترجم  -- écouter la voix traduite
2. Web-based communication tool

Localisation section

Looking for a place? tap you query here..

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2. Web-based communication tool

Contact section

Share the tool link

View the survey

Click here to start our survey!
2. Web-based communication tool

Survey

** Help us to Improve our tool **
** ساعدنا على تحسين أدائنا **
** Aidez-nous à améliorer notre outil **

What is your overall satisfaction with our tool?
ما هو رأيك العام عن أدائنا؟
Quelle est votre satisfaction globale avec notre outil?

- Very satisfied
- Satisfied
- Not sure
- Dissatisfied
- Very dissatisfied

If No, please give us your feedback!
إذا لا، برجى إعطائنا رأيًا!
Si non, SVP nous donner votre avis! 😊

Feedback visualization

<table>
<thead>
<tr>
<th>New user</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction Feedback</td>
<td>This tool helps us to communicate!</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Yes</td>
</tr>
<tr>
<td>Recommendation Feedback</td>
<td>Definitely</td>
</tr>
<tr>
<td>Design and Color</td>
<td>Yes</td>
</tr>
<tr>
<td>Design and Color Feedback</td>
<td></td>
</tr>
<tr>
<td>Sound</td>
<td>Not sure</td>
</tr>
<tr>
<td>Sound Feedback</td>
<td>doesn’t work in some items!</td>
</tr>
<tr>
<td>Homepage</td>
<td>Yes</td>
</tr>
<tr>
<td>Homepage Feedback</td>
<td>It helps to get important infor!</td>
</tr>
</tbody>
</table>
3. Dynamic multilingual ontology

4 levels; 91 concepts
3. Dynamic multilingual ontology

Example of extracted items annotated in OWL

```xml
<owl:Class rdf:ID="Food">
  <rdfs:comment>Food is a sub-concept belonging to Household Consumables</rdfs:comment>
  <rdfs:subClassOf rdf:resource="#Household Consumables" />
</owl:Class>

<owl:Class rdf:ID="Fruits">
  <rdfs:comment>Fruits is a sub-concept belonging to Food</rdfs:comment>
  <rdfs:subClassOf rdf:resource="#Food" />
</owl:Class>

<owl:Thing rdf:about="#الخضروات" rdfs:label xml:lang="en">Pineapple</owl:Thing>  
<owl:Thing rdf:about="#النارنجات" rdfs:label xml:lang="fr">Ananas</owl:Thing>
```

Item in Arabic  Sub-concept  Translation in “En” and “Fr”
3. Dynamic multilingual ontology

Generation of a dynamic multilingual ontology comprises four steps:

1. Collection of a study corpus from Wikipedia and linguistic analysis

2. Development of an NLP module to create an ontology and learn it with Arabic items extracted from the study corpus

3. Development of an automatic translation module to generate a multilingual ontology (English and French languages)

4. Automatic generation of images related to the stored items
3. Dynamic multilingual ontology

Generation of the multilingual ontology

KIWIX

Collection of unstructured articles

Conceptualization

Term analysis and identification

Matching

Annotation paths

OWL syntax
3. Dynamic multilingual ontology

Generation of the multilingual ontology

Annotated term extraction

Extracted in OWL

Arabic Terms annotated in OWL

Translation based on API

Terms annotated in OWL and translated in English and French

Translator: PHP code

Arabic Annotated articles

Output NLP process

Extractor: PHP code
4. Conclusion and Future Work

Linguistic study using a Wikipedia corpus (conceptualization, term identification and matching both with an annotation syntax)

Proposing a dynamic and extensible Web-based communication tool for Arabic newcomers to Canada based on:

- Dynamic and multilingual Ontology
- NLP techniques and APIs
4. Conclusion and Future Work

• Improve the Learning English module for children newcomers

• Text to sign language translation module in three languages (Arabic, English and French) and vice versa

• Sign language to speech translation module in three languages (Arabic, English and French) and vice versa
Thank you!

• Questions?