MOOC Translation for OPEN HPI

Automated Translation of E-learning content and community created content

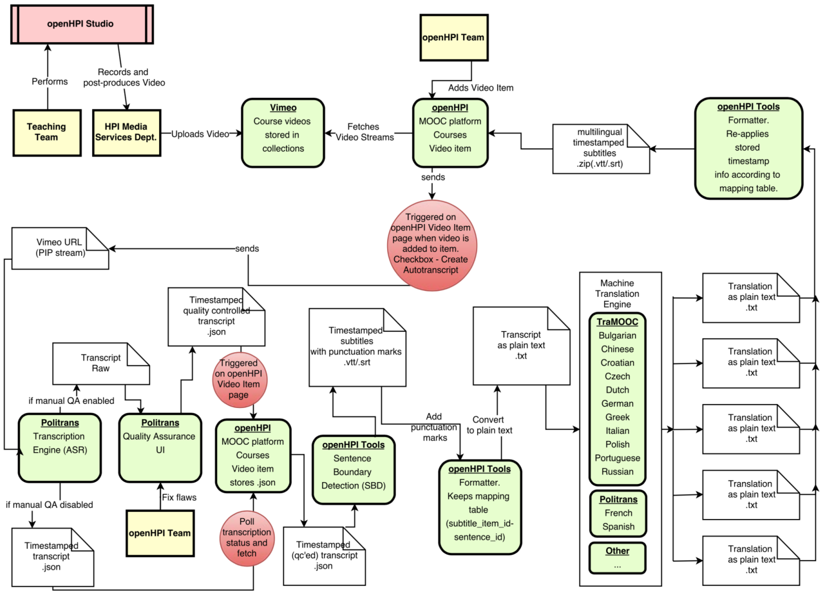
Motivation

The audience of openHPI courses in English language often has a very international background. Only a minority of the participants are native English speakers. For many of them, subtitles in their native language are a valid and important enhancement of the course materials. Transcribing and translating the courses manually would require a major financial investment.

Another use case emerges on OpenWHO, the MOOC platform of the World Health Organization (which is powered by the same software as openHPI). Often, the population in those countries that are frequently affected by epidemics doesn't speak English but rather a variety of local dialects. Producing separate courses (on the same topic) in all required languages would be very cost- and time-intensive.

Automated transcription and translation is a very effective tool to reduce the costs for these procedures. We already have several components at hand that we are using in this context. However, the whole process still requires many time-intensive manual steps that could be replaced by an appropriate tooling.

openHPI Forum talk by Christian Willems and Markus Egg: https://www.tele-task.de/lecture/video/6574



openHPI Studio
Performs
Records and post-produces Video
Teaching Team
HPI Media Services Dept.
Uploads Video
Vimeo
Course videos stored in collections
Fetches Video Streams
openHPI Team
Adds Video Item
openHPI
MOOC platform
Courses
Video item
multilingual timestamped subtitles .zip(.vtt/.srt)
openHPI Tools
Formatter.
Re-applies stored timestamp info according to mapping table.
sends
Triggered on openHPI Video Item page when video is added to item. Checkbox - Create Autotranscript
Vimeo URL (PIP stream)
sends
Timestamped quality controlled transcript .json
Transcript Raw
Triggered on openHPI Video Item page
if manual QA enabled
Politrans
Transcription Engine (ASR)
Politrans
Quality Assurance UI
openHPI
MOOC platform
Courses
Video item
stores .json
Timestamped subtitles with punctuation marks .vtt/.srt
openHPI Tools
Sentence Boundary Detection (SBD)
Add punctuation marks
Transcript as plain text .txt
Convert to plain text
openHPI Tools
Formatter.
Keeps mapping table
(subtitle_item_id-sentence_id)
Fix flaws
openHPI Team
if manual QA disabled
Timestamped transcript .json
Poll transcription status and fetch
Timestamped (qc'ed) transcript .json
Machine Translation Engine
TraMOOC
Bulgarian
Chinese
Croatian
Czech
Dutch
German
Greek
Italian
Polish
Portuguese
Russian
Politrans
French
Spanish
Other
...
Translation as plain text .txt
Translation as plain text .txt
Translation as plain text .txt
Translation as plain text .txt
Translation as plain text .txt

Fig. 1: draft proposal for openHPI subtitle transcription and translation

Challenges

Translation of learning content is a very complex workflow (see Fig. 1), that consists of a number of very different steps. A large proportion of the workflow can be automated, some can be outsourced to the crowd. However, some steps may need editorial supervision or manual quality assurance.

A workflow for providing translated video subtitles roughly goes through the following steps:

I. Video Transcription
   A. Automated Speech Recognition (Speech to text)
   B. Sentence Boundary Detection (Determine proper punctuation)
   C. Cueing (Maintain timing information for subtitles)
   D. Quality Assurance (Important: mistakes from transcription will “grow exponentially” in the subsequent steps)

II. Subtitle Translation
   A. Pre-processing (Prepare text content for translation; must be full, single sentences)
   B. Machine Translation
   C. Post-processing (Re-create subtitle cues with proper timing; format conversion)

III. Connect subtitle tracks to video ressources

Additional content types in the context of MOOCS that are only subject to translation, but not to transcription, would be PowerPoint Slides, (rich-)text content, quizzes, or forum discussions.

Project Objectives

There are a number of tools for a part of the workflow steps available from research projects, EU projects or technology partners, including:

- Automated Subtitle Generation Toolkit (ASGT) - developed at the HPI by Xiaoyin Che et al. in an earlier Master’s Project
- Transcription: Universidad Politecnica de Valencia (https://politrans.upv.es/)
- Translation Engines: TraMOOC, SAP Leonardo translation engine, DeepL

Other tools exist on the market or as Open Source initiatives, some tools might yet have to be built.

The actual project objectives are:

- Rethink the proposed translation workflows (see Fig. 1)
- Evaluate existing tools and choose a technology stack
- Evaluate the use of open standards for machine-translation APIs
- Try to avoid as many manual steps as possible
- Implement the “missing links”, establish a consistent workflow
- Create a dashboard for content editors allowing to supervise and control the workflow
- Design a solution that can be integrated with various content sources (e.g. other LMS)
- Optional: Speech Synthesis (Text to speech) for translated subtitles?

Project Partner

World Health Organization / OpenWHO

World Health Organization

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