The D-WISE Tool Suite: Multi-Modal Machine-Learning-Powered Tools Supporting and Enhancing Digital Discourse Analysis

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ABSTRACT

The D-WISE Tool Suite (DWTS) is a novel working environment for digital qualitative discourse analysis in the Digital Humanities.

- The DWTS addresses challenges introduced by large amounts of heterogeneous, unstructured, and multi-modal data in which current discourses are encoded.
- The DWTS provides meaningful insights by leveraging current NLP and CV technologies.
- The DWTS is an outcome of D-WISE, a collaborative and interdisciplinary research project between Humanities and Computer Science.

CENTRAL FEATURES

1) Support for multi-modal data including text, image, audio, and video documents.
2) ML-powered preprocessing pipelines for automatic annotations and semantic embeddings.
3) Lexical and multi-modal semantic search and filtering of large document collections.
4) Manual span, bounding box, time-span, and frame annotations.
5) Functionality to document and reflect the research process.

TECHNICAL DETAILS

Multi-Modal Embeddings
- Sentence Transformers* (Text), CLIP-ViT* (Image), Whisper* (Audio), X-CLIP* (Video)

Efficient Retrieval and Storage
- ElasticSearch*, FAISS*, PostgreSQL

Client-Server Application
- React frontend, FastAPI backend

Preprocessing Pipeline
- Dockerized Celery workers

Automatic Information Enrichment
- spaCy* (NER), DETR* (Object Detection), BLIP2* (Image Captioning), Whisper* (Transcriptions)

Document Import
- Apache Tika (PDF, DOCX), Scrapy + Readability.JS (HTML, URL)

* Please find the respective reference in our paper