Team DH

Annotation tool backbone

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Overview

Annotation tools are software applications that allow users to label, tag, or highlight specific areas of digital content, such as images, videos, or text. These tools are used in various industries, including medical, legal, and academic research, where analyzing large volumes of data is crucial.

The quality of annotations heavily relies on the frontend design of the annotation tool. Therefore, designing an efficient frontend framework is crucial for developing a reliable annotation tool.

With the help of an annotation tool, users can easily and accurately annotate data, which can further be used for various applications like object detection, image segmentation, or text classification.

Non-Functional Requirements

- Scalability: The UI components should be designed in such a way that later they can be integrated with different teams easily.
- Responsive: The UI must be responsive so that it can be used on different systems.
- Usability: The system should be user-friendly and easy to use, with clear documentation and error messages to help users troubleshoot issues.
- Security: Later when the backbone is integrated with the other features like authentication system, then privacy of users should be maintained.

Requirements

- Designing a ToolBox component with basic annotation features like bounding box, text annotation, delete annotation.
- Making sure that all the menus are designed such that they can be collapsed and draggable to resize the dynamically.
- Design different viewers like image viewer, video viewer, DICOM viewer.
- Design a component for taxonomy in which taxonomy can be uploaded using json file.
- Design a a component for AI/CV pipeline where users can create the sequential pipeline which can be later connected with different ai models.
- Implement the functionality of image uploading and then annotate the image using toolbox.

Technology Used

- Javascript
  - ES Lint
- React JS
- Konva
- DICOM viewer
- Material UI

Components and Implementation:

1. ToolBox
2. Draggable Side Menus
3. Live Annotations
4. Taxonomy
5. AI/CV Pipeline
6. Side Menu with buttons to toggle features of Annotation Tool.
7. Viewers:
    a. Image Viewer (with Feature of Annotation Added)
    b. Video Viewer
    c. DICOM Viewer

ToolBox

A component that gives various Tools for Annotating the image.

Implemented:

a. Bounding Box
b. Eraser
c. Annotation

Implemented Using React Konva, which is a JavaScript library that provides a canvas-based drawing API.

With the help of the toolbox, users can easily annotate data with accuracy and speed.

Draggable Menus

A user can move side menus according to the user requirement.

A user also has option to collapse the menus to get full screen view in the tool.

Tool also supports three views:

a. Annotation View
b. Complete View
c. Full Screen View

Implemented using react-resize-panel library, which is a library that allows users to resize and reposition panels easily.

Live Annotations

Live annotations are a component of the annotation tool that allows users to select the annotation value from the taxonomy component and assign it to the bounding box or any other shape in the toolbox.

Users can select the annotation and its corresponding shape to highlight the area in the annotation image. With the help of the live annotations, users can easily and accurately annotate data.

Taxonomy

The taxonomy is a component of the annotation tool that allows users to upload the JSON file with the hierarchical taxonomy and load all the values in the taxonomy component.

Users can assign the value to the annotation after clicking on the taxonomy value. With the help of the taxonomy, users can easily assign the correct value to the annotation, which can further be used for various applications like object detection or image segmentation.

AI/CV Pipeline

The AI/CV Pipeline component has a user interface for designing the pipeline, and users can perform undo and execute operations after integrating the pipeline with AI models.

Users can see the sequential flow of the pipeline, making it easy to understand and modify.

The AI/CV Pipeline component is an important component of the annotation tool as it allows users to integrate AI/CV models with the annotation tool, making it easier to annotate large volumes of data.

Left Side Menu

This menu allows the user to use various features present in Annotation Tool.

a. Toggle between different views
    i. FullScreen
    ii. Annotation View
    iii. Complete View
b. Select the Viewers
    i. Image Viewer
    ii. Video Viewer
    iii. DICOM Viewer
c. Open other features like:
    i. Project management, User management, Save File, Open Project, New Project , etc.

Viewers

Following Viewers are added to the Annotation Tool:

a. Image View
   i. User Can Upload Images.
   ii. User can annotate the image with bounding box.
   iii. User can select the taxonomy value for each box.
   iv. User can delete/select the annotations.
b. Video View
   i. User can play videos.
c. DICOM View
   i. Following open source DICOM viewer (https://github.com/ivmartel/dwv-react) will be integrated.
   ii. All the necessary files are added. (Bugs to be resolved)

Code Structuring

- Well Commented (every file is well commented such that new developer can easily understand whole code)
- Professional (variable name are well written, folder structure is neat)
- Reproducible (code is modular and break in small parts such that reuseable)

Challenges

- Integrating the DICOM viewer
- Designing components that can be resized and collapsed.
- Implementing the feature where user can draw and annotate the images.

Results

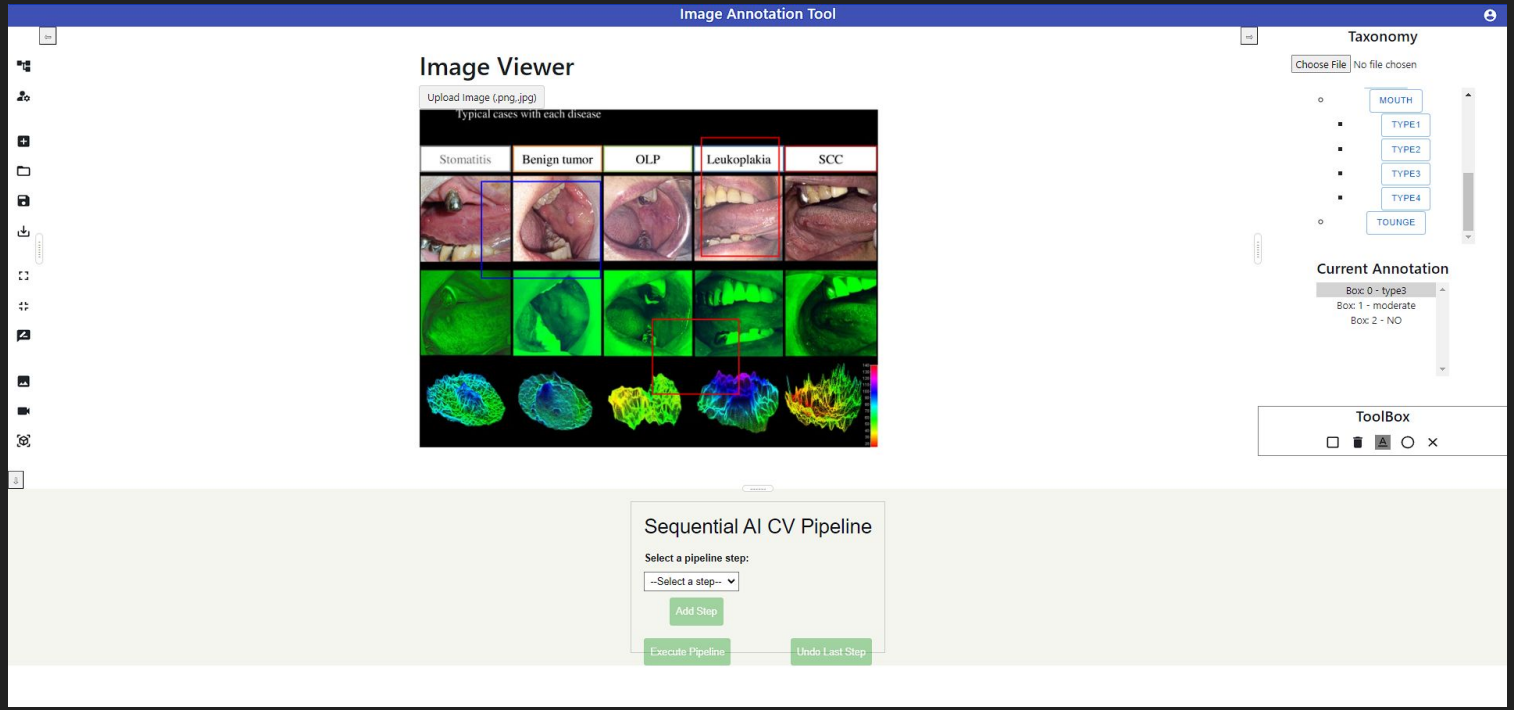
Image Annotation Tool
Image Viewer
Upload Image (.png,.jpg)
Typical cases with each disease
Stomatitis
Benign tumor
OLP
Leukoplakia
SCC
Taxonomy
Choose File
No file chosen
MOUTH
TYPE1
TYPE2
TYPE3
TYPE4
TOUNGE
Current Annotation
Box: 0 - type3
Box: 1 - moderate
Box: 2 - NO
ToolBox
Sequential AI CV Pipeline
Select a pipeline step:
--Select a step--
Add Step
Execute Pipeline
Undo Last Step

Contribution

Avi Kothari:

Implemented ToolBox, live annotation,Image Viewer, DICOM viewer, Draggable Components, basic UI framework, added comments

Arth Raj:

Implemented Taxonomy, Video Viewer, Collapsable Menus.

Bhaiya Vaibhaw Kumar:

Implemented AI/CV pipeline component, created slides, added comments.

THANK YOU