Deep zoom (Hyper zoom) of extremely large images with React.JS

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OVERVIEW

Deep Zoom is a technology for efficiently transmitting and viewing images. It allows users to pan around and zoom in a large, high resolution image or a large collection of images. It reduces the time required for initial load by downloading only the region being viewed or only at the resolution it is displayed at. Subsequent regions are downloaded as the user pans to (or zooms into) them; animations are used to hide any jerkiness in the transition. Upon researching deeply i found that upon all others libraries; OpenSeaDragon was best among others because it is implemented with pure javascript which is fit for react projects.

Why OpenSeaDragon

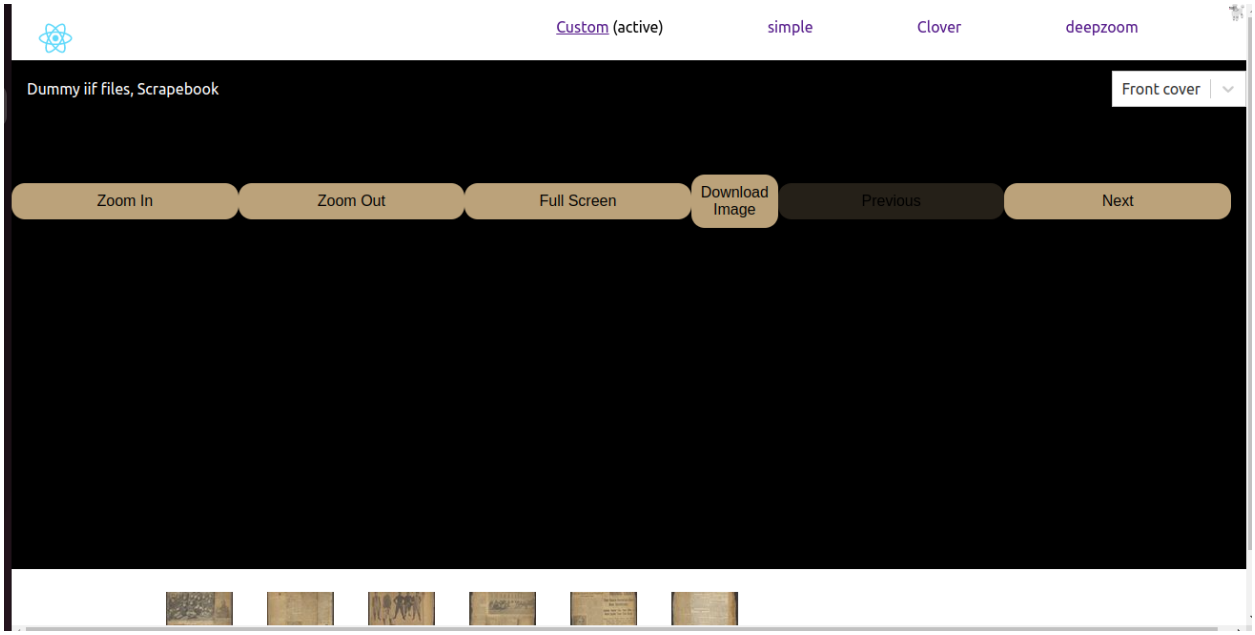
Currently Web-based digital slide viewers for pathology commonly use OpenSlide and OpenSeadragon (OSD) to access, visualise, and navigate whole-slide images (WSI). Their standard settings represent WSI as deep zoom images (DZI), a generic image pyramid structure that differs from the proprietary pyramid structure in the WSI files. The transformation from WSI to DZI is an additional, time-consuming step when rendering digital slides in the viewer, and inefficiency of digital slide viewers is a major criticism for digital pathology.

OpenSeadragon supports several image serving protocols out of the box and is actively adding support for more. If the image serving protocol you need is not supported, you can always add support for yours using a custom tile source. (Please help us add built-in support for your required image serving protocol.) Each supported protocol aims to allow configuration via XMLHTTPRequest, JSONP, as well as direct inline configuration.

- Legacy Image Pyramids
- IIIF (International Image Interoperability Framework)
- DZI (Deep Zoom Images)

- OSM (Open Street Maps)
- TMS (Tiled Map Service)
- Zoomify
- Custom Tile Sources

IMPLEMENTATION

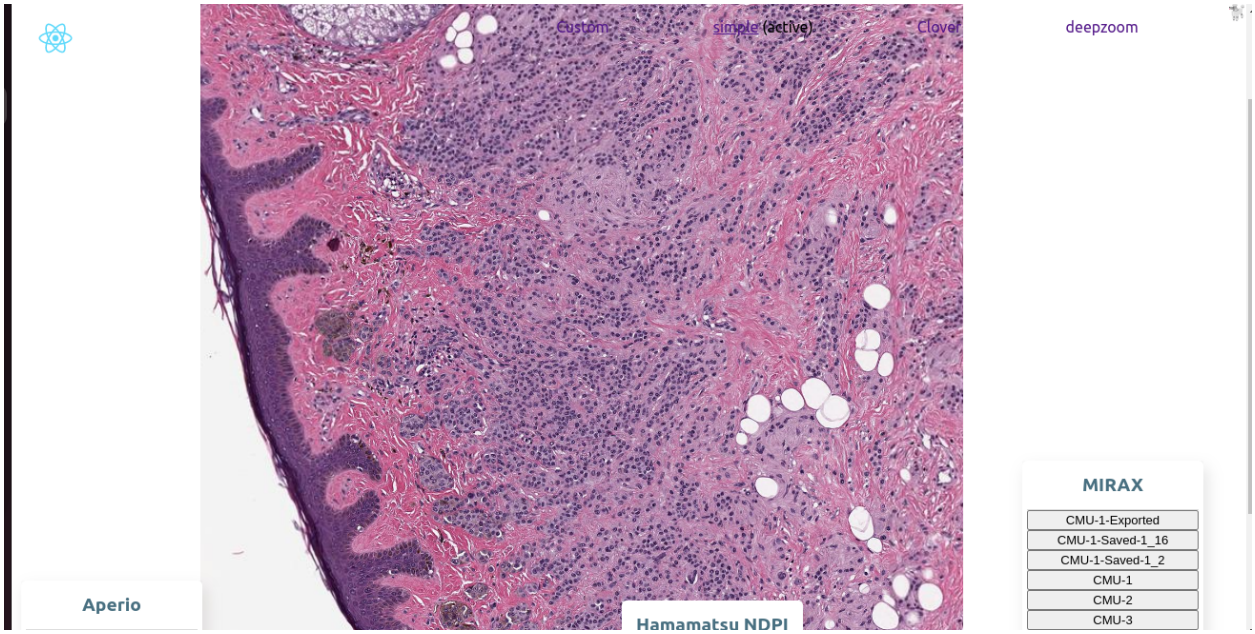


- Github repo: https://github.com/JohannThapa/deep-zoom
- Website: https://classy-speculoos-bcea97.netlify.app/

I have implemented a React project in the above repo to see the real differences and analyse how it is sufficient for fulfilling end meets.

As you can see from the url that i have created 4 pages where each page has its unique way of zooming the High definition image. Here are following pages with their features:

1. **Custom**: I have created custom interface elements such as thumbnails, toolbar, image viewer etc to check if we can apply custom UI in the library or not where I found it works great with custom styling. Although this page is not working due to 403 errors which can be easily solved if we have our own image files.
2. **Simple**: In this page i have used microscopic organism images to see how much we can zoom into the image.



In this page you can find a toolbar which is already provided by the library and an image list which was custom styled by me. You can check different images by selecting the list below the page. Due to less image size present in this page you cannot zoom that much far but if there was a large image size you can zoom unlimitedly.

3. **Clover**: This page uses external package (https://github.com/samvera-labs/clover-iiif) which is IIIF Presentation API Manifest viewer handling Image, Sound, and Video canvases solely for React.js.Clover IIIF is a UI component that renders a multi canvas IIIF item viewer for Video and Sound content resources with pan-zoom support for Image via OpenSeadragon. Provide a IIIF Presentation manifest and the component:
    - Renders a multi-canvas Video, Sound, and Image viewer
    - Renders thumbnails as navigation between canvases
    - Renders annotations with the motivation of supplementing with a content resource having the format of text/vtt for Video and Sound

- Video and Sound are rendered within a HTML5 <video> element
- Image canvases are rendered with OpenSeadragon
- Supports HLS streaming for .m3u8 extensions
- Supports IIIF Collections and toggling between child Manifests

4. **Deep zoom**: This page has a high definition image which was solely built for testing zooming abilities of this library so you cannot find external features such as thumbnails, toolbars etc here . You can check zooming abilities on this page.

Fig: Zooming in right image.

FILES

This is **manifest** files used in **Custom** page which is made of Canvases.

```
const dummy = {
   "@context": "http://iiif.io/api/presentation/2/context.json",
   "@type": "sc:Manifest",
   "@id":
```

```
"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json",
   label: "Dummy iif files, Scrapebook",
   description: [
     'Scrapebooks from  iiif library',
   ],
   metadata: [
     { label: "Permalink", value: ["ark:/81985/n2nz81119"] },
     { label: "Date Created", value: ["1899/1904"] },
     { label: "Creator", value: ["Johnson, Jimmy, 1879-1942"] },
     {
       label: "Rights Statement",
       value: ["http://rightsstatements.org/vocab/InC-EDU/1.0/"],
     },
   ],
   sequences: [
     {
       "@type": "sc:Sequence",
       "@id":

"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json/sequence/normal",
       rendering: [],
       canvases: [
         {
           "@type": "sc:Canvas",
           "@id":

"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json/canvas/c331c48e-0dda-4e4b-a566-b9a
5e0129ce3",
           label: "Front cover",
           width: 640,
           height: 480,
           images: [
             {
               "@type": "oa:Annotation",
               motivation: "sc:painting",
               resource: {
                 "@type": "dctypes:Image",
                 "@id":
```

```
"https://iiif.stack.rdc.library.northwestern.edu/iiif/2/c3%2F31%2Fc4%2F8e%2F-0%
2Fdd%2Fa-%2F4e%2F4b%2F-a%2F56%2F6-%2Fb9%2Fa5%2Fe0%2F12%2F9c%2Fe3/full/600,/0/de
fault.jpg",
                height: 480,
                width: 640,
                format: null,
                service: {
                  "@context": "http://iiif.io/api/image/2/context.json",
                  "@id":

"https://iiif.stack.rdc.library.northwestern.edu/iiif/2/c3%2F31%2Fc4%2F8e%2F-0%
2Fdd%2Fa-%2F4e%2F4b%2F-a%2F56%2F6-%2Fb9%2Fa5%2Fe0%2F12%2F9c%2Fe3",
                  profile: "http://iiif.io/api/image/2/level2.json",
                },
              },
              on:

"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json/canvas/c331c48e-0dda-4e4b-a566-b9a
5e0129ce3",
            },
          ],
        },
        {
          "@type": "sc:Canvas",
          "@id":

"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json/canvas/0c4c6c92-45e2-45ce-9490-812
f46e866c3",
          label: "Inside front cover",
          width: 640,
          height: 480,
          images: [
            {
              "@type": "oa:Annotation",
              motivation: "sc:painting",
              resource: {
                "@type": "dctypes:Image",
                "@id":

"https://iiif.stack.rdc.library.northwestern.edu/iiif/2/0c%2F4c%2F6c%2F92%2F-4%
2F5e%2F2-%2F45%2Fce%2F-9%2F49%2F0-%2F81%2F2f%2F46%2Fe8%2F66%2Fc3/full/600,/0/de
```

```
fault.jpg",
                height: 480,
                width: 640,
                format: null,
                service: {
                  "@context": "http://iiif.io/api/image/2/context.json",
                  "@id":

"https://iiif.stack.rdc.library.northwestern.edu/iiif/2/0c%2F4c%2F6c%2F92%2F-4%
2F5e%2F2-%2F45%2Fce%2F-9%2F49%2F0-%2F81%2F2f%2F46%2Fe8%2F66%2Fc3",
                  profile: "http://iiif.io/api/image/2/level2.json",
                },
              },
              on:

"https://iiif.stack.rdc.library.northwestern.edu/public/06/20/ea/ca/-5/4e/6-/41
/81/-a/85/8-/39/dd/ea/0b/b1/c5-manifest.json/canvas/0c4c6c92-45e2-45ce-9490-812
f46e866c3",
            },
          ],
        },
      ]
    }]
  }
```

This is used for displaying images used in Deep zoom page where you can see that it is using Jpg images.

```
const json = {
   Image: {
       xmlns: "http://schemas.microsoft.com/deepzoom/2008",
       Url:
"https://openseadragon.github.io/example-images/highsmith/highsmith_files/",
       Format: "jpg",
       Overlap: "2",
       TileSize: "256",
       Size: {
           Width:  "7026",
           Height: "9221"
       }
   }
```

```
};
```