

ANALYSING PAINTINGS

"Paintings fade like flowers", Vincent van Gogh once wrote to his brother. Without conservation scientists, painted art would lose its pigment, impact, and beauty over time. To restore paintings back to their original state, it is vital to know how they were originally composed. By taking special X-ray images (X-Ray Fluorescence, XRF), scientists are able to detect the elemental composition of van Gogh's faded flowers. XRF is the release of fluorescence from a material which has been exposed to high-energy X-ray.

THE ISSUE

Current software solutions for analysis of paintings only target specific needs. These tools usually consist of basic representations of individual elemental maps and interactive image viewers. These solutions do not fully exploit the potential of XRF data, such as exploring the relations between the elemental compositions.

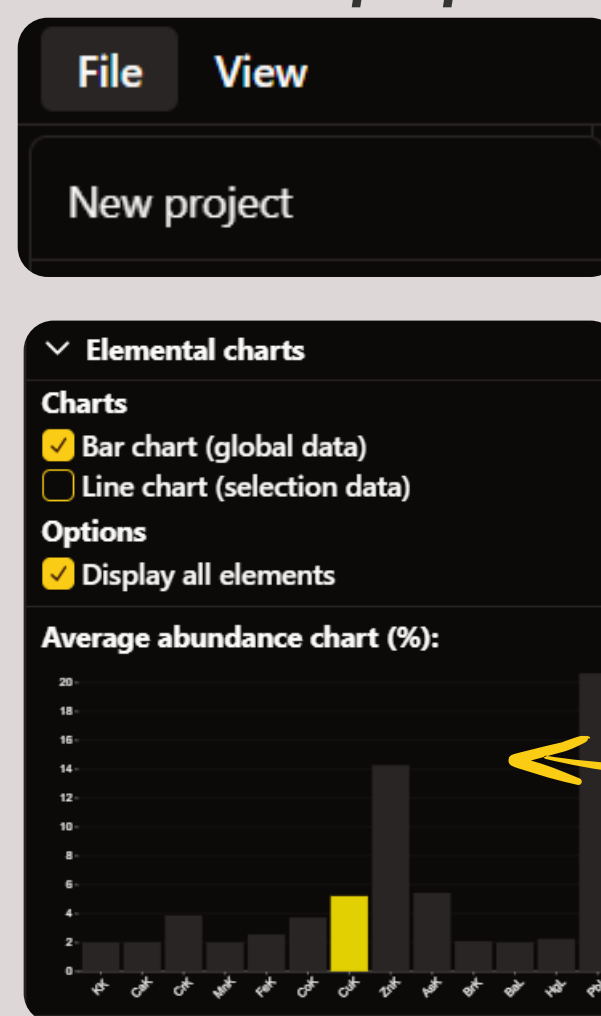
THE XRF-EXPLORER

The XRF Explorer web application builds upon the current efforts and gained insights and allows the analysis of data, in relation with contextual data such as RGB, UV and X-Ray images. It provides an integrated environment that combines the strengths of all individual data sources, with a user-friendly interface.

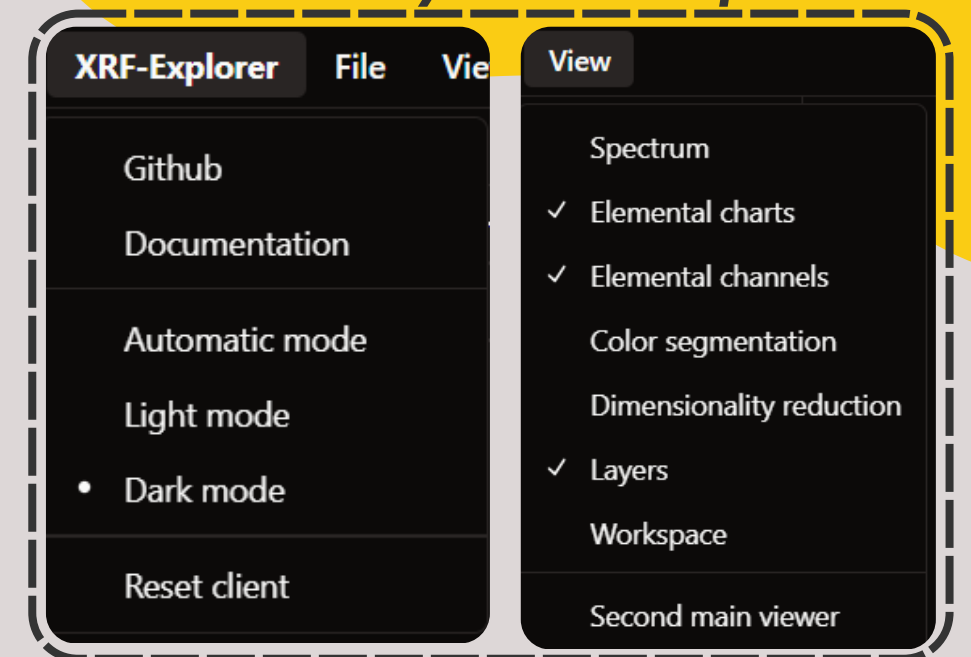
General capabilities

- View contextual images
- Adjust the color properties of the images
- View the presence of elements in the painting
- Use the layer system
- Compare layers using the lens
- Make selections using the provided tools
- Generate dimensionality reduction embeddings
- Explore colors using color segmentation
- Visualize data in graphs
- Export generated images

Create new projects



Customize your workspace

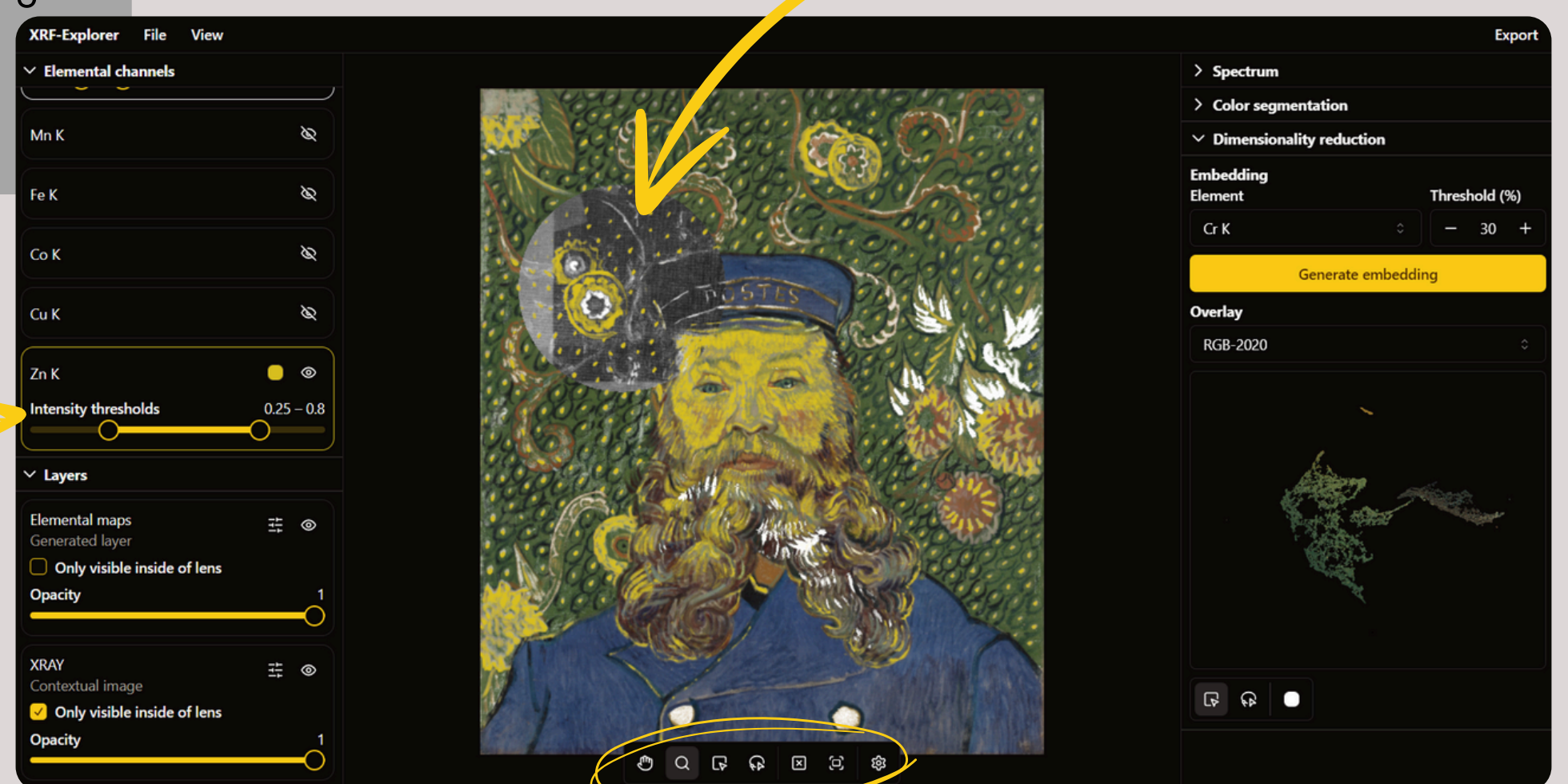
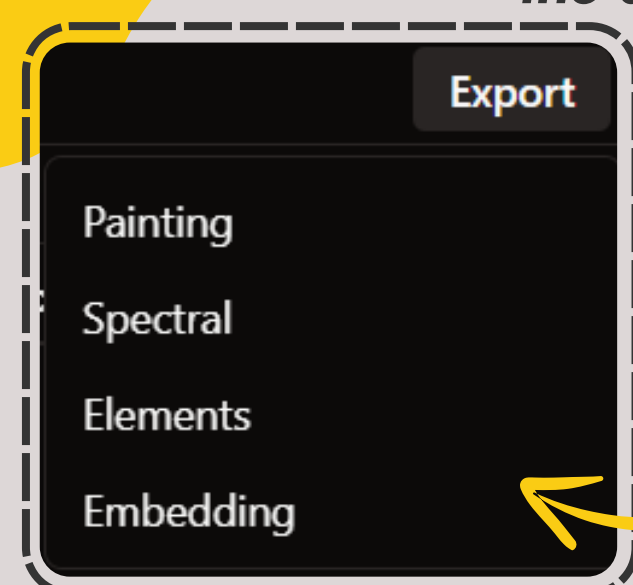


Visualize elemental data using different charts

View Layers through the Lens tool

Highlight elements in the desired color

Export your findings



Make use of the provided tools

TOOLS USED

Frontend:

Vue.ts - frontend framework
WebGL - painting rendering

Backend:

Python - backend framework
Flask - routing backend to frontend

The XRF-Explorer compartmentalizes different functionalities within their own windows which have been constructed in Vue.ts. These windows are displayed to the user in the frontend, but the core functionality of these windows is computed in the backend using Python. Through Flask API fetch calls, the frontend is able to communicate to the backend and its computations. The heart and soul of the application, the image viewer, is managed in the frontend through GLSL shaders.

Supporting tools/libraries: Shadcn (ready-made UI components), Tailwind CSS (CSS framework), d3.js (data visualization library), sphinx (documentation)

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