



#### Scenario 4

### HISTORICAL PHOTO AND FILM COLLECTIONS

This scenario addresses colour degradation in historical photo collections, particularly in **autochromes** and **Kodacolor images**. PERCEIVE aims to digitally reconstruct their original colours, preserving personal, real-life moments from the last century, costumes, traditions and architectures, all by ethically applying **AI techniques**.



PERCEIVE aims to enhance the digital capabilities of scientists and cultural institutions through a service-based AI toolkit and new design theories for VR/AR/MR experiences, focusing on “Care,” “Accessibility,” and “Authenticity.”

Scan the QR Code and learn more!



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# PERCEIVE

## TOOLS & SERVICES

SCENARIO 4 / FADING COLOURS  
IN HISTORICAL PHOTO AND FILM  
COLLECTIONS

## COLOUR KNOWLEDGE REPOSITORY

Marios Pitikakis, Sophia Sotiropoulou (FORTH)

The CKR is an **open data management system for collecting and sharing colour-related resources** in cultural heritage. It includes documentation, simulations, protocols, and workflows addressing colour change and preservation.

### doLCE 2.0

Saptarshi Neil Sinha (Fraunhofer IGD), Giorgio Trumpy (NTNU)

doLCE 2.0 is a digital tool that reconstructs the original colours from **early Kodacolor films**—black-and-white reels that used lenticular technology to capture colour information. By extracting and decoding this **embedded data**, doLCE 2.0 brings rare historical footage back to life, preserving the visual heritage of early amateur colour film for future generations. It offers an **accessible** and **non-invasive way** to digitally restore and safeguard these fragile materials.



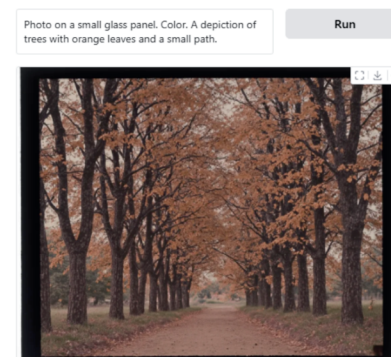
## TEXT2AUTOCHROME

Julius Kühn, Duc Anh Nguyen Saptarshi Neil Sinha (Fraunhofer IGD)

**Autochromes**, developed by the Lumière brothers in the early 1900s, is considered the first commercially successful colour photography processes. They feature a distinctive soft, muted colour palette and a unique pointillist aesthetic, derived from the **potato starch granules** which make up the autochrome's colour filter. Today, displaying original autochromes is rare as original autochromes are extremely light sensitive. For this reason, and we mostly see digitised or facsimile versions in exhibitions.

Our new approach utilises **advanced generative models** to create images that attempt to capture the autochrome's unique quality, simulating common defects in autochromes like greening and cracking to develop machine learning methods for repair and enhance the quality of generated images.

Text2Autochrome demo!



## DEGREENING

Saptarshi Neil Sinha, Julius Kühn, Johannes Koppe (Fraunhofer IGD)

Preserving **autochromes** is essential for understanding early colour photography due to their historical and artistic significance. However, their **fragility** poses challenges for conservation and restoration, as they are sensitive to physical damage and environmental conditions.

To train **AI models** for restoring images with **greening defects**, we simulate these defects (synthetic defects) since we lack reference restored images.

Using AI, we **digitally restore autochromes** by first identifying and removing greening areas with a model trained specifically for this purpose. Next, we restore the original colours in those areas using a specialised AI inpainting model for autochromes.

This approach enables us to effectively train our model and achieve **plausible restorations, even without reference images**.

