

Before the Restoration

Reto Kromer • AV Preservation by reto.ch

Open-Source Tools and Resources for Audio-Visual Archives

Elías Querejeta Zine Eskola
Donostia (San Sebastián), Spain
1–4 and 9 June 2021

1

Table of Contents

- principles
- preparation
- digitisation
- conservation

2

Principles

๒. สิทธิของอนุชน

๒.๑ ด้วยตระหนักในความรับผิดชอบของตนในอันที่จะอนุรักษ์
ฟิล์มภาพยนตร์ให้ดำรงอยู่อย่างยั่งยืน หอภาพยนตร์จักยืน-
หยัดต่อการบับบงคับใด ๆ ที่จะกำจัดหรือทำลายสิ่งของ
ที่หอภาพยนตร์ได้เลือกที่จะปฏิเสธ
หรือรับส่งของใด ๆ ที่มีเส้นลหอกบสสมด้วยเหตุผลกล
ใดซึ่งอาจอยู่นอกเหนือกฎเกณฑ์ว่าด้วยการอนุรักษ์หรือ
นโยบายการคัดเลือกที่ใช้อยู่ของหอภาพยนตร์นั้น

๓. สิทธิในการใช้ประโยชน์

๓.๑ หอภาพยนตร์ตระหนักว่า สิ่งของในความดูแล มีทั้งมูลค่าใน
เชิงพาณิชย์และคุณค่าในทางศิลปะ จึงไม่สมควรปล่อยให้สูญ

3

Conservation

Conservation encompasses all activities for the care of an object, which **delay its further decay** and ensure that it remains in the most intact condition for the future.

4

Restoration

Restoration includes all interventions and treatments that serve to **retrieve a certain historical state** and contribute to the legibility, aesthetic integrity or **reuse** of an object.

Restorative actions may be irreversible and require great care in planning, justification, execution and **documentation**.

5

An Ounce of Ethics

- The probability that a work is available in its integrity in the future is increased.
- All the options that existed before taking an action remain open after the action.
- Every step is carefully documented.

6

Live in the real world!

There is only one efficient way:

- keep the source elements
- more prevention:
 - better insulation
 - more efficient air conditioning
- less handling of the source elements
- make access copies

7

File Formats

- **The archive must be able to handle the file formats it holds.**
- open source
- simple to use and well documented
- widely used by the community

8

Different Purposes

archive master format:

→ for preservation

mezzanine format:

→ for professional use in post-production

dissemination formats:

→ for widely spreading and easy access

9

Film

- film as document or work of art
- elements of the film
- actual reel

11



10

Sources

- splices repair
- perforation repair
- film cleaning
- chemical treatments
- ... and beyond

12

Splices

- cement
- tape
- re-splicing

13

Perforation

- tape bridges
- film bridges
- acetone
- notches
- V-cuts

14

Cleaning

- PTR
- manual cleaning
- machine cleaning
- dry
- using a solvent
- re-washing

15

Cleaning

- PTR
- manual cleaning
 - machine cleaning
 - dry
 - using a solvent
- re-washing

16

Chemical Treatments

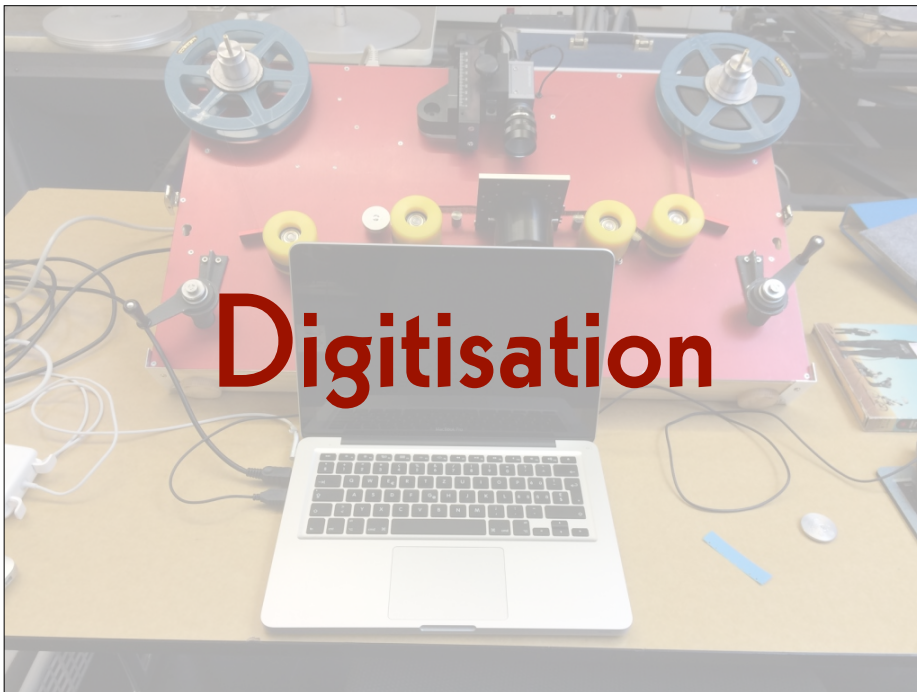
- drying
- humidifying
- mould fungus
- swelling the emulsion
- re-development
- hardening the gelatine

17

... and Beyond

- transfer the emulsion onto a new base
- keep only the emulsion

18



19

Scanner

- film transport
- light source
- camera
- image section
- wet scanning
- file format

20

Film Transport

- sprocket
- PTR
- tension
- film path, guide and gate
- reels
- continuous vs. step-by-step

21

Light Source

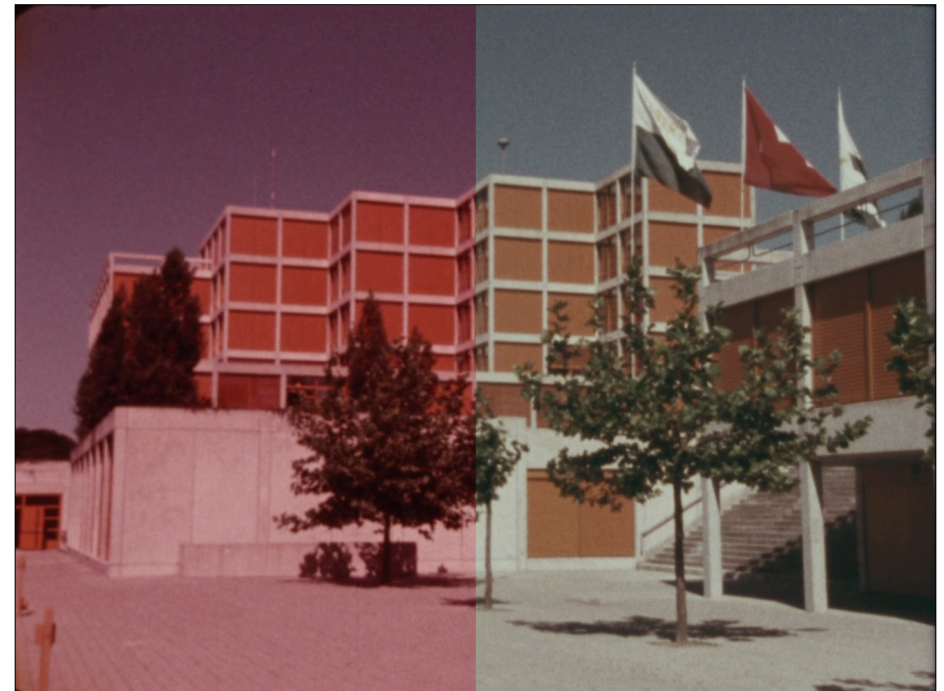
- diffuse
- direct
- white
- coloured
- illuminant

22

Light Source

- diffuse
- direct
- white
- coloured
- illuminant

23



24

Camera

- image sensor
- resolution
- bit depth
- «raw» data
- lenses

25

Two ways to use Bayer data

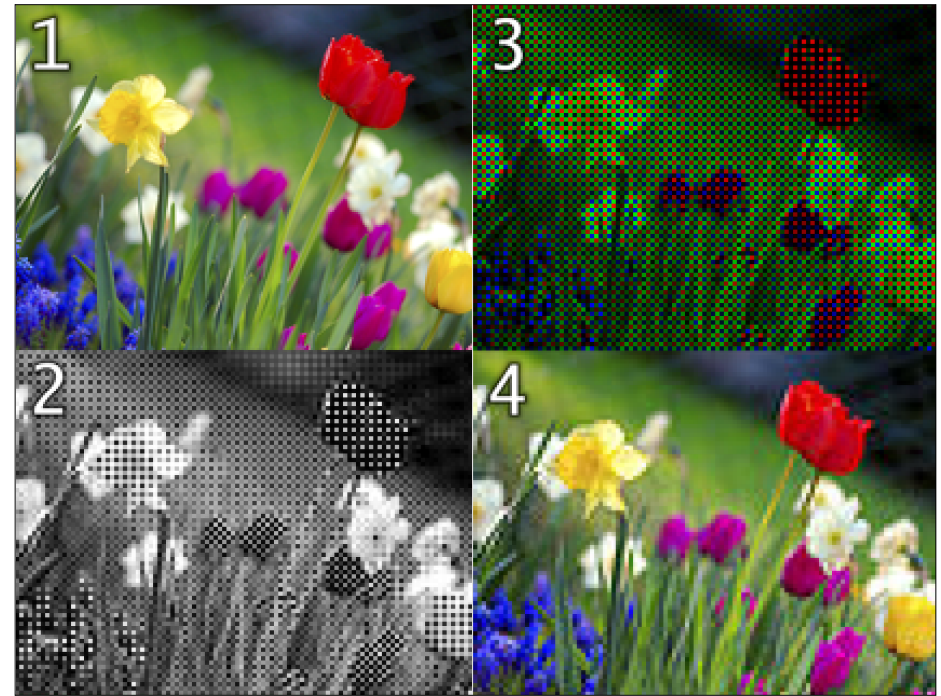
digital blow-up to RGB

- 3 times the amount of the generated data
- the file has the full sensor resolution
- only $\frac{1}{3}$ of the data are real

digital reduction to RGB

- $\frac{3}{4}$ the amount of the generated data
- the file has $\frac{1}{2}$ of the sensor resolution
- all data are real

27



26

Image Section

- camera
- projector
- safe area
- over-scan
- edge to edge

28

Wet Scanning

- wet transfer
- full immersion
- pre-wet
- solvent

29

Data is anything
but "raw".

30

Audio Raw Data

- pcm_s16le
- pcm_s24le
- pcm_s32le

31

Video Raw Data

- | | |
|------------------|---------------|
| • rgb48le | • yuv444p16le |
| • rgb24 | • yuv422p10le |
| • rgb72le | • uyvy422 |
| | • yuv420p |
| • bayer_bggr16le | |
| • bayer_bggr24le | |

32

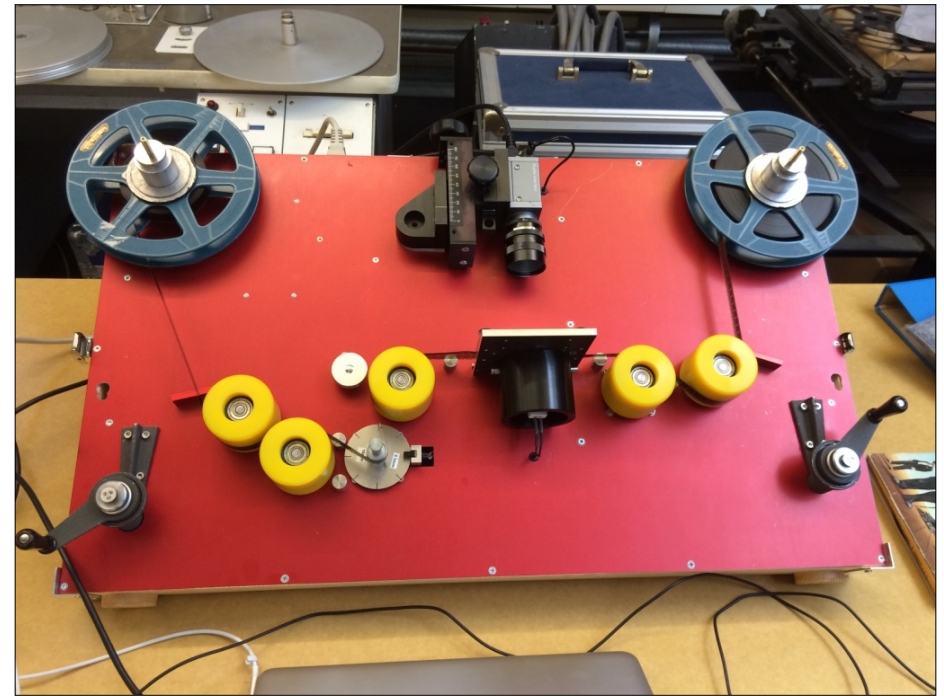
File Format

single image:

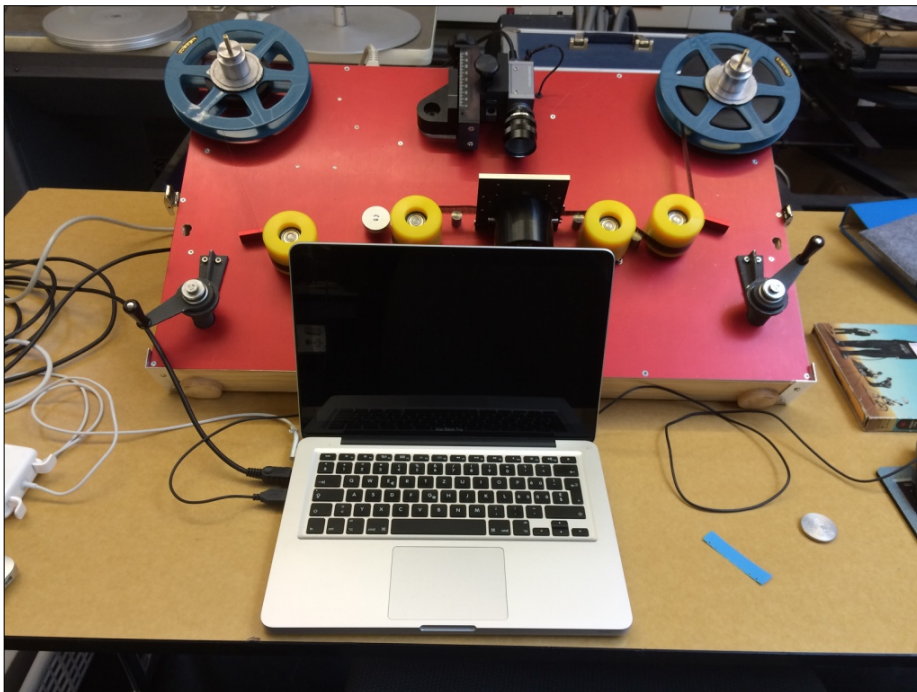
- DPX 12-bit
- TIFF
- JPEG 2000
- OpenEXR
- DNG

stream:

- Y'CbCr 10-bit uncompressed
- FFV1



34



35



36

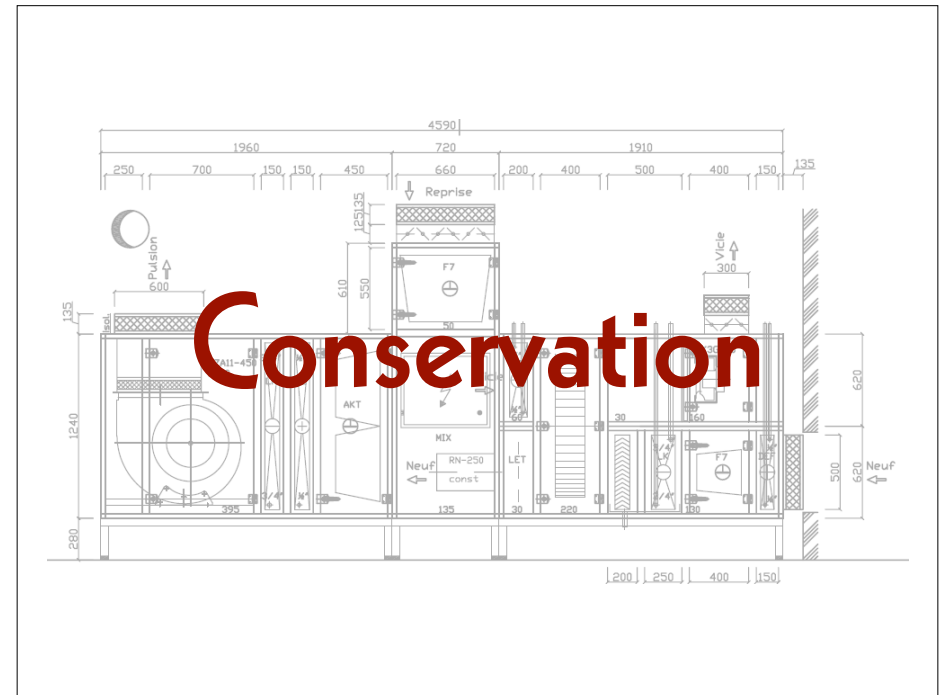


37

Source

- de-restoration
- cleaning
- preparation

39



38

AV Preservation by reto.ch

zone industrielle Le Trési 3
1028 Préverenges
Switzerland

Web: reto.ch
Twitter: @retoch
Email: info@reto.ch



40