

Introduction

What is Digitisation? It's a process of converting an analogue physical image into a series of digital picture elements called pixels. These pixels are arranged in a two-dimensional matrix called a bitmap. Compare this to traditional photographs which are composed of miniscule clumps of silver or dyes.

An important part of digitisation is the imaging sensor responsible for changing light into electrical signals. The common detectors are: (1) Charged coupled devices (CCDs), used in flatbed scanners and digital cameras (2) Photo-multiplier tubes (PMTs) used in drum scanners and (3) Complementary metal oxide semiconductors (CMOS chips) also found in flatbed scanners and digital cameras.

In both scanners and digital cameras, a lens or set of lenses are used to focus an image onto the sensor. Scanners also have built-in light sources to illuminate the items being scanned. Light is reflected or transmitted by the object and focussed by the lens onto the sensors. This creates an electrical current proportional to the light. The electrical signal is then divided into discrete numerical values which can then be stored.

To access the image again (viewing on a monitor or printing) the digital information is converted back to an analogue form.

Why Digitise?

Digitisation is integral to the preservation of original photographs from the wear and tear of use or even eventual complete destruction. Once digitised the original can be stored in optimum cold storage conditions: conditions which are not conducive to access or use.

Access, retrieval and sharing of the digital copy is then much easier. Digital also provides many

more uses over analogue images including emails, exhibitions, presentations, publications, slide shows, social media, photo-streams, and websites.

Digital photographic restoration also allows for modification of copies. The original image may be ethically preserved for future research with no loss of data that may come about through an analogue restoration process.

Before You Start

If you have decided to digitise one photograph or an entire collection there are a number of issues to be aware of. First decide on why and who you are digitising for. Family holiday snapshots will probably not need the stringent and costly guidelines of a national archive.

Now you can evaluate the photographs for any physical evidence of deterioration. Staples and paperclips should be removed. Dust and small smudges may be gently dusted off (never use water). However if any signs of structural deterioration is visible consult a conservator. These can include;

- Supports or photographs that are brittle or sticky.
- Delaminating or fragmenting layers
- Powdery residue
- Severe discolouration
- Dog ears or tears
- Sticky tape attached to the photograph
- Bubbling negatives and a strong smell.

Always consider that flat-bed scanners exert pressure and handling for photography can cause irreparable damage to fragile emulsion surfaces.

Do you really need to remove photographs from albums and frames?

Some photographs like daguerreotypes are often sealed into cases. Don't remove these as exposure may cause unwanted chemical reactions. *If damage may occur or a photo is fragile it's better to consult a conservator and photograph with a digital camera.*

Environment

Ensure a well-lit, clean dust free environment with minimal foot or air traffic, minimal direct light reflection exposure or fluctuations in temperature and humidity. These negatively affect both photographs and calibrated equipment. Clean the scanning bed or camera lens as directed by the manufacturer.

Lighting greatly impacts the quality of capture. Use diffused light/flash and black cloth to cover unwanted reflected glare.

Calibration of Input Device and/or Image

For true colour, scale, and perspective correction commercial targets are available to calibrate scanner, camera, image monitor and printer. These targets are used to standardise colour settings across all digitisation equipment, as well as to standardise the output image in post-production.

Settings

There are many different scanner and camera platforms and operating systems. The interfaces may vary but the general settings remain the same. Due to their

complexities, most will be covered in a separate workshop.

COLOUR

The main colour models in use today are CMYK (Cyan, Magenta, Yellow, Key=Black) and RGB (Red, Green, Blue). In general CMYK is used for print jobs and RGB for on-screen works.

Digital bit depth creates at least three colour modes;

- Bit depth 1 = Black and White (bi-tonal, appropriate for text and line drawings).
- Bit depth 8= Greyscale (256 grey tones appropriate for drawings and black and white photographs).
- Bit depth 24 = Colour (16.7 million colours). Due to the additional colour channels of RGB or CMYK it's advisable to scan both colour and black and white photographs in Colour mode for added depth.

RESOLUTION

Digital image files should have sufficient resolution to capture a high level of detail, this is measured in pixels per inch (ppi) for electronics or dots per inch (dpi) for print. Factors to consider include the optimal optical resolution of your capture device and the highest resolution of the output device (currently 400 dpi). The recommended resolution is worked out by multiplying the application resolution by the size of the output image.

Resolutions			
Application	Application Resolution	Size	Final Resolution
Web Publishing	100	1.5	150ppi
Laser Printer	200	3.0	600dpi
Commercial Banner	300	2.5	750dpi

400-600 dpi is a good general resolution for quality archival photographic digitisation

HISTOGRAMS AND CURVES

Use histograms to adjust shadows and highlights to ensure tonal depth and retention of detail. Do this for each colour channel but be careful not to cramp the data.

Mid tone correction is achieved via Curve adjustment. Document any adjustments in metadata. Adjustment can be made after capture, but is not recommended.

FILE FORMAT

Digital files require active management and should be created in standard file formats.

Scan the earliest or best quality iteration of your subject. Scan once: a highest resolution **Master copy** in TIFF (Tagged Image File Format) which allows for long term storage or RAW format with very little processing in camera. These will be large files.

The Master copy is the official copy and should never be edited. Make two copies of this and store in separate offline storage in case of disaster.

From the Master copy **General use** or **Access copies** (edited for consumption) can be created. These will be for sharing, general research, emails, copying etc. The compressed file format JPEG (Joint Photographic Experts Group) is acceptable: reducing the file size but open to image distortion via 'interpolation'.

JPEG is not a long term preservation format.

Web Use are extremely low resolution and watermarked files to deter copyright infringement.

Storage

At high resolutions storage space will be an issue. External hard drives of over 1 terabyte are now commercially available.

A plan for redundant storage will help ensure long-term access to materials, but once files are placed on a storage device, they must be checked regularly to guard against device failure and data loss (at least once a year).

Data will have to be migrated over time as the hardware and software become obsolete (at least every five years).

Metadata

Metadata describes the object and the technical creation specifications of the digital file. It should always accompany each file.

Capture technology automatically generates metadata: The Who?, What?, Where?, How?, When? but not the Why? of creation. The creation date, type of equipment, the format and how it was digitised are included.

You should also add additional information for the photograph like:

- Title
- Creator of the Image
- **Subject terms** (very important for search tools)
- Description
- Creation date of original image
- Physical location of original capture
- Rights and licencing

Photographic Software

Adobe Photoshop, Lightroom, Photoshop Elements and Microsoft Office Picture are common programmes that offer management and editing of photographs.

Scanning Tips

- Wear nitrile gloves as the natural oils and acids on your hands permanently damages the silver compounds or dyes of photographs.
- Cotton gloves can catch on the surface of old photographs and cause greater tactile and dexterity loss.

*If gloves are not available
WASH AND DRY YOUR
HANDS OFTEN*

- Don't use multi-function scanners as they are usually of reduced quality.
- Never use the automatic feed option as paper-jams can damage photographs
- Stable photographs with a curl may be gently flattened by a covered weight.
- Capture the entire image and any special backings or casing as they make up the entire object.

*Capture Once: Use Many
Times*

- Future uses have not been discovered yet so overestimate your resolution needs.

Camera Tips

Copy stands are ideal, if not a tripod or makeshift stand will make do.

- Use a dark grey or white background to set off the photograph.
- A book cushion or cradle will support albums safely.
- Photograph the verso (back) as well as the recto (front) if labels or inscriptions are on the back.
- Bracketing the exposure levels will allow for choice in post-production.

Smart-phone Tips

- Maximise the size of file captured in all cell-phone settings. Take images at the highest quality settings possible.
- Keep the plane of the phone the same as the image by using a support or a perspective calibration tool on a mirror.
- Use the timer to reduce blur via hand trembles.
- Instead of using zoom, position the phone at the correct distance from the subject.

*Use a piece of
transparent tape to
diffuse a strong cell-
phone flash.*
