Digitizing Photographs for Restoration

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Restoration or Conservation?

Restoration of photographs has been going on since the birth of photography and may in fact be seen upon as an integral part of photography itself. *Conservation* of photographs though is an activity which only during the last 15 years or so has taken off as a serious business.

Whether to restore or conserve has often led to discussions on what is ethically acceptable to do in the process of preserving images. The question of the status of a photograph as an artefact in itself or just a keeper of information is complex. The object, a negative or a print, might be a historical object in its on right when looked upon as a technique. We have daguerreotypes, salted paper, albumen prints etc. When we look upon the image it is a portrait, an interior or just about anything that can be captured in a two dimensional format with a lot of different aspects on the value of its information.

Conservation of photographic materials should as far as possible be a question of what the word conservation actually means, namely to conserve in its present state. Preventive measures for slowing down deterioration such as keeping temperature and relative humidity low, keeping things clean and in the dark are fundamental and is the best way to preserve *both the artefact and its information*. To keep handling at a minimum is yet another important measure. Some times, though, it is necessary to perform chemical treatment in order to retrieve the image information, which otherwise would completely and for ever disappear. In this case the *information* is the main object for taking measures.

In the latter case the measures eventually taken will almost certainly mean work in the darkroom and/or in the lab. The potential risks of damaging the object even more during these activities are obvious and chemical treatments are to be considered thoroughly in every case. They may in fact change the original object chemically. For example the silver image may be transformed from one kind of silver compound to another. It may be compared with an oil painting treated with chemicals, turning into an acrylic painting.

Until a few years ago the preservation of image information employed such activities as the moving of emulsions from one support to another, chemical treatment of faded or stained photographs retouching on originals etc. Many of the chemical and chemical/-physical treatments that have been used were not intended for the use in preservation at all and the long term effects of these are to some extent unknown to us.

With this in mind and the prospects of using new technology within conservation of photographs, I started experimenting with digital processing of photographs in 1985. The purpose was to examine the possibilities to obtain information not perceived directly by the eye. With the help of the Professor in Physics at the Royal Polytechnic Institute in Stockholm, Nils Åslund, some photographs were scanned and processed with a Hasselblad OSIRIS Interactive Scanning System. The results were promising but not satisfactory and left a lot to be desired.

As the personal computer revolution took off in the late 1980's Mogens Koch, at the School of Conservation in Copenhagen and I started planning a co-operation project on digital restoration of photographs. The project took off in 1990-91 when hardware and software started to give very good results as well as being affordable. In 1993 we received a grant of 35.000 USD from the Victor and Erna Hasselblad Foundation for further research within this field.

Reconstruction of image information.

The use of digitisation in the conservation of photographs, or rather the *reconstruction* of image information, means that it is now possible to retrieve a lot of image information without abusing the artefact while using chemical methods. Partly or completely faded negatives and prints can be enhanced to an agreeable level. Faded colour photographs can also be restored. There are even some things that were simply not possible to do earlier but now are relatively simple to perform. For example restoring extremely flaked emulsions or making images covered with mould visible again through digital filtering. On the other some chemical treatments cannot be replaced by digital.

Digital treatment means minimum handling in a safe environment and there is almost no danger of accidental damage to the object either physically or chemically. It is also less time consuming than traditional restoration process.

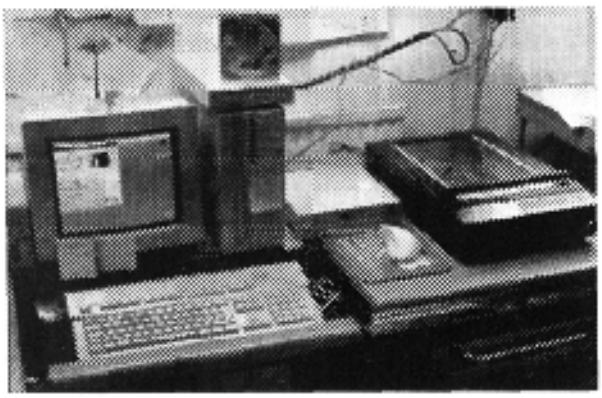
Today the basic equipment used is a personal computer and a scanner which can scan with both reflected and transmitted light. The computer should preferably have quite a lot of random access memory (RAM) and a large hard disc. Digital images take up a vast amount of memory, depending on size and resolution chosen in the scanning process. The higher the resolution, the more memory it takes. The software used to manipulate the image is an advanced image processing program. Density curves, focusing, light, contrast, advanced digital filtering, and colour separation are only a few things possible.

To store these images it necessary to have a medium that will let you store memory-consuming items. The access to the restored images is either with a computer or as printed images. For printing a high quality digital continuos tone printer is needed. The density range with which the printer can produce pictures should be as large as possible, for example between 0.07-2.5 on prints and 0.07-2.7 on transparencies.

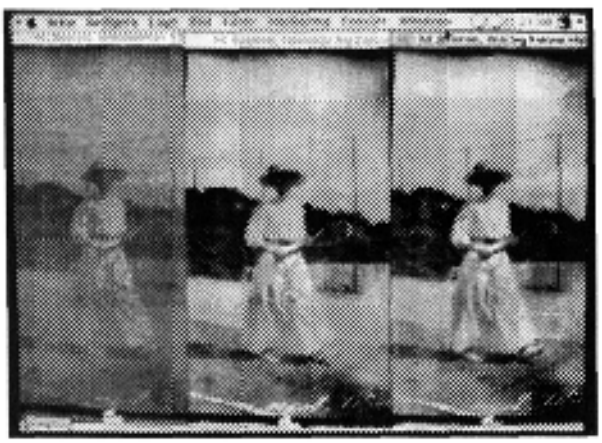
Conclusions

As a conclusion it can be said that the use of digital processing in the conservation of photographs opens up a lot of possibilities previously unheard of and actually makes salvaging image information safer, cheaper and less time consuming than before. Information is obtained and the artefacts are intact. But we must be aware of preserving the artefacts becomes even more important now as we use digital processing. They are the ultimate proof and if we discard them in favour of digitized copies we are lost in pixel-space.

Illustrations

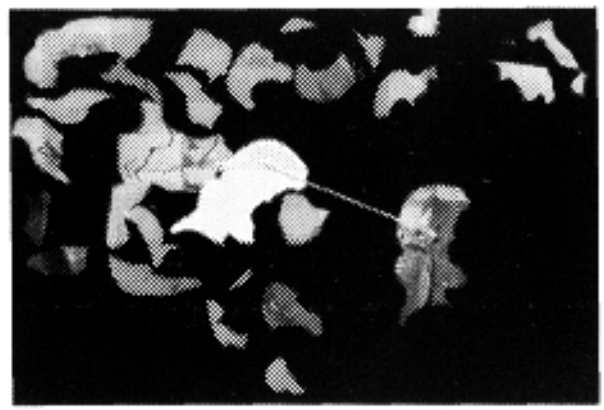


1. An example of basic equipment with computer, scanner, removable hard disk and a CD-ROM drive.



2. This faded image would normally - of course depending on the original technique being used - be treated chemically or with filtering in the darkroom to enhance the fading information. Here three versions of the same image are shown. The one on the left is as it is exposed by the scanner. The one in the middle have had its density curve modified and the one on the right has got an extra sharpening as well. The changing of the gamma is made on the screen in real-time on a gamma-graph exposed on the monitor.

3. The pieces of a faded negative is put on the flat bed scanner and scanned.



4. After the scanning the image was inverted to positive which makes it easier to have visual control of the work performed. Each individual piece can be picked out and "moved" freely around or copied to a new window. Here a white spot is left after a piece have been moved to the right. All pieces may be moved around like this on the screen, turned or even mirrored if a piece was accidentally scanned up-side-down.

5. The remaining pieces are put together and digitally 'retouched'. The retouching is made on the screen.

6. Reconstructed image information.