

An Introduction to Photoediting Resources

Summary

- Photo editing can provide substantial improvements in the quality of images. Editing is essential for RAW images but is also useful for JPEG and other images which have had some degree of in-camera editing.
- In some situations, such as focus stacking and high dynamic range (HDR) photography, editing is essential.
- The combination of Adobe Photoshop™ and Lightroom™ is currently the most popular editing resource for professional and advanced amateur photographers but there are some good commercial alternatives available, including both simple and comprehensive programs. There are also several free, open-source programs available for the budget-conscious photographer which provide a wide range of editing tools. There is no single 'best program' and while the Adobe suite is the most popular, some photographers claim that Capture One and DxO PhotoLab are better for RAW file development and use these instead in combination with Lightroom and Photoshop.
- There are several specialist programs for particular applications, such as focus stacking, HDR and denoising which may be used as an alternative to general-purpose programs.
- Photo editing software is constantly being improved; it is important to read recent reviews when choosing software as most programs regularly introduce new or improved features. Some reviews are provided by software producers and favour their own products.
- Some programs offer compatibility with aspects of other programs, such as the ability to use Photoshop plugins and the ability to export image files which can be used in Photoshop.
- There is a wealth of articles and videos on the internet comparing programs. These need to be read carefully as they are not always comprehensive or accurate.
- This article covers the major computer-based photo-editing programs and some lesser-known programs but is not an exhaustive coverage. It does not cover online editors such as Photopea, programs such as Canva which are more focused on graphic design, video editors or the many photo-editing apps available for smartphones.
- Most photo-editing programs include a substantial number of features. The basic features typically include RAW development, denoising, sharpening, exposure, contrast, saturation, cropping, straightening, white balance, colour grading, healing/cloning, chromatic aberration, lens correction, geometric corrections and monochrome conversion. Some of these features overlap and the number of program features tends to increase, so that even a free program such as darktable has over 70 different 'modules'.

Considerations in choosing photo editing software

There are many factors to be considered in choosing editing software and to get the best outcomes some photographers choose the combination of a full-featured program for the majority of their work together with specialist programs for specific applications such as HDR or focus stacking and denoising, even where these features are also available in the main program.

Operating system compatibility

Most photo-editing software has versions compatible with Windows and Mac and some also can be used with other systems such as Linux. A few are only available for Windows or Mac.

Comprehensive features

Photoshop and Lightroom jointly offer one of the most comprehensive set of editing capabilities for the professional and advanced amateur photographer. However, some other commercial and open-source

programs offer a very wide range of editing tools, sufficient for many photographers.

Simplicity vs complexity

Most of the commercial programs offer a large number of features and these features may overlap or interact with each other. While professional photographers and advanced amateurs can benefit from having many features, the complexity of some programs results in a long learning curve. Beginners to photo processing can get a lot of experience from using simple programs, or staying with a small range of edits, before tackling the more complex programs.

Price and payment options

Price can be a consideration for many amateur photographers. There are many options, ranging from free to very expensive. Some programs require a subscription, generally with monthly and yearly payment options. Photoshop and Lightroom are available only on a monthly or yearly subscription. Other programs are available for direct purchase on a 'lifetime' basis, although upgrades to later editions with additional features generally require additional payment. Some programs offer discounts on upgrades and others do not. Some buyers of 'lifetime' licences have complained that they have not been offered a discount on upgrades after buying shortly before a major upgrade. A 'lifetime' licence is effective as long as the hardware and operating system supports it. In practice, this can result in the software becoming unusable in the long term. Also, 'lifetime' licences will generally be effective with ongoing proprietary RAW files such as Nikon' NEF but may not apply to new RAW file formats and to lens corrections when new lenses are introduced.

Some programs offer a choice of purchase or subscription. In recent years some companies have structured their pricing so as to encourage the subscription option.

Most programs offer free trial period to enable assessment before deciding on a purchase, while others offer a refund of the purchase price after a short trial. Short-term special price offers are also common and can be particularly attractive during the 'Black Friday' period in November. Prices shown in this paper were effective from mid-2023 and are subject to change.

Quality of RAW conversion

Most photo-editing programs are able to edit RAW files. In a few cases, such as the otherwise comprehensive Program GIMP, RAW conversion is not available. However, various plug-ins, commercial programs and free programs can be used to 'develop' RAW images to produce files in various formats, including lossless formats, which can then be further edited.

A web search for 'best RAW editor' produces many different results. One useful source, lifeafterphotoshop.com has a number of articles worth reading, including 'DxO PhotoLab vs Lightroom vs Capture One – which is best for RAW files?' This article covers the capability of these three programs in eight aspects of RAW development and subsequent processing.

Selective editing capabilities

Programs which include layers, masks and other localised adjustments enable selective editing of parts of an image, similar to the 'dodging and burning' techniques of film photography.

Non-destructive editing

Many programs edit images through application of edits in a separate 'sidecar' file, so that the original file is retained unchanged and can be re-edited if necessary. When using programs which lack this feature, it is a good idea to make a copy of the original before editing.

File formats and compatibility

In addition to the camera manufacturers' proprietary image formats, there are several other lossless formats, such as DNG, PNG PSD and TIFF and compressed file formats such as JPEG. PSD is the standard format for Photoshop and some programs are able to export PSD files which can then be edited in Photoshop. There are programs and on-line services for converting images between various formats.

Plug-in compatibility

Some programs such as Photoshop and GIMP have 'plug-ins' which are not part of the basic program, but which can be added in and used in conjunction with the program. In view of the extensive development and usefulness of plug-ins, some photo editing programs offer the capability to use plug-ins developed for other programs.

Optimisation for particular cameras and lenses

The more complex programs recognise the make and model of individual cameras and the particular lenses used, optimising images using this information to correct for colour modes and lens distortion.

Some programs are not capable of editing RAW images from Fujifilm cameras using the X-trans sensor. However, many of the commercial programs and free programs including Rawtherapee and darktable can edit X-trans RAW images.

Frequency of updating

Some programs have regular updates for new modes and sensor types while others are slower.

Artificial intelligence capabilities

Some programs now include artificial intelligence (AI) capabilities which offer additional features such as sky replacement and facial recognition and automation of some editing functions. The use of AI in software is increasing and is likely to further improve editing programs.

Colour modes

Computers display images using the red-green-blue (RGB) colour mode while printing uses the cyan-magenta-yellow and black (CMYK) colour model. For photographers who intend to print images, the ability to export files incorporating CMYK colours is essential. One review of GIMP, for example, states that it lacks the CMYK mode. However, there is a GIMP plug-in for this application.

Computer and mobile phone utility

Some programs are available in versions for Windows, Mac and other operating systems while others are only available to Windows or Mac versions. GIMP is compatible with Windows, macOS and Linux, but not with Apple tablets. Photoshop and Lightroom are both available as apps for mobile phones but require an Adobe account. For mobile phone users, there are many photo editing apps.

Computer memory and processing capabilities

More comprehensive programs require substantial amounts of computer memory, RAM and fast processors.

Library functions

Some of the more comprehensive programs have well-developed 'Digital Asset Management' features allow for handling of quantities of images, allowing for rating of images, and easy organisation and retrieval.

Batch processing

For photographers who take large numbers of photographs in a session, such as at weddings or sports events, the ability to

Tethering

Tethered photography involves shooting images with a camera connected to a computer. This can be done

wirelessly, but wired connections are faster and more reliable. Some editing programs, including Lightroom, Capture One, DxO PhotoLab and darktable have this capability.

Number of program copies

Some programs are limited to use on a single computer while others can be used on more than one. Free programs have no limitations.

Commercial photo editing software

Although many cameras have a range of editing functions built-in, further editing in a computer is important to get the best results from your photographic equipment. There are many commercial programs available, ranging from simple programs with a limited number of functions to highly complex programs with many functions. Some of these are available for direct purchase, some have a subscription model, with monthly and annual payment options, and some offer both subscription and purchase options. Many of the programs are free to download on a trial basis. Some programs provide free access to a basic set of editing functions with additional functions available to purchase in 'premium' versions.

Photoshop and Lightroom

For the professional and high-level amateur photographer, the choice of software is often a combination of Adobe Photoshop and Lightroom. These are available in several comprehensive plans which also include Adobe Camera RAW, Adobe Spark (movie editing) and Adobe Portfolio (website) plus other programs and 20GB of storage at AUD 14.29 a month. A lifetime licence option is not available, for these programs, although this option is available for the simpler program Photoshop Elements.

Photoshop Elements

A more limited set of editing functions is available for direct purchase in the form of Photoshop Elements (AUD 147.00 for the 2023 version) and Premiere Elements 2023, which includes video editing (AUD 227.00 in combination with Photoshop Elements). These functions include AI-assisted editing.

A separate plug-in, Elements+ (elementsplus.net), is a third-party app which provides access to a substantial number of Photoshop functions of which are not otherwise available in Photoshop Elements. It costs USD 12.00 for the 2023 version. (There is another program 'Elements Plus!' which is a plug-in for a non-photographic software program.)

Capture One Pro and Capture One Express

Capture One Pro is a sophisticated program aimed at professional and advanced amateur photographers. It is available on a direct purchase (USD 505) and subscription (USD 41.00/ month or 303.00/ year options). Some reviews claim that it provides better RAW file development compared with Photoshop but note that the range of editing options, while substantial, are not as extensive as Photoshop. Capture One Pro has increased in price in recent years. However, Capture One Express, which has versions specifically for Nikon, Fujifilm and Sony is still available as a free download. It includes RAW conversion and basic editing features.

Affinity Photo

Affinity Photo 2 is a low-cost (AUD 109.99) program but has a wide range of tools, including RAW editing, HDR merge, panorama, focus stacking, batch editing and layers. A recent review describes it as a powerful program at an excellent price. It is said to be less intuitive than Photoshop and Lightroom but there are many educational resources available.

Luminar

Luminar software has gone through a number of versions in recent years. The current iteration, Luminar Neo, is a powerful program with a range of AI editing capabilities. Several functions are available as add-on 'extensions' which need to be purchased separately. These add significantly to the overall cost, though

special offers are often available. Luminar Neo comes in three versions costing AUD 139 and 169 for annual licences, or 259 for a lifetime licence. Adding the current extension options to the lifetime licence brings and the cost of the lifetime licence to AUD 458.

ON1 Photo Raw

ON1 Photo Raw, costing AUD 19.73 has a wide range of tools and has good reviews for its editing and photo management capabilities. ON1 also has a plug-in bundle for Photoshop, Lightroom, Capture One, Affinity Photo and other programs, costing AUD 254.61. On1 products are also available on subscription.

DxO

DxO has a number of programs which can be used stand-alone or in conjunction with other programs. *DxO PureRAW* is a specialist RAW editor, producing enhanced files for further processing in Photoshop, Lightroom, or other programs. The current version, PureRaw3, is priced at US 129.

DxO PhotoLab6 has a wide range of photo editing tools. While it lacks some of the tools found in Photoshop, one review claims that its advanced denoising module is superior to the Photoshop equivalent. PhotoLab6 costs USD 139 for the 'Essential' edition, while a premium Elite edition, which includes the improved denoising and other features of *PureRaw*, costs USD 219.

DxO Nik Collection5 is a group of eight programs and 250 pre-sets covering noise reduction, sharpening, perspective correction, colour and tone control, monochrome imaging and other functions. These are generally used as plug-ins with other software but can be used stand-alone. The collection costs USD 149.00. *At present (2023) a purchase of the Nik collection comes with DxO Photolab5 Essential Edition.*

Exposure X7

A review of Exposure X7 calls it a powerful program with many editing features, and fast and simple operation. It can also be used in conjunction with other programs and is relatively low-cost at USD 119.

ACDSee Photo Studio

ACDSee is a fairly comprehensive editing and digital asset managing program, available for direct purchase in five versions, Photo Studio Ultimate Pack 2023 (USD 209.00) Photo Studio Ultimate 2023 (USD 149.99), Photo Studio Professional 2023 (USD 99.99), Photo Studio Home 2023 (USD 59.99) and ACDSee Gemstone Photo Editor 12 (USD 79.99). Subscription plans are also offered.

Corel Paintshop Pro 2023

Paintshop Pro 2023 is the latest version of a long-standing program which has been updated to include a number of new features. It has been described as 'a worthy Photoshop alternative for a more affordable price'. It costs AUD 149 for a lifetime licence.

inPixio Photo Studio 12

inPixio is a simple-to-use program for beginners but with a reasonably comprehensive set of tools. It is available only on subscription, at USD 49.99 a year. A free trial is available.

Photo Ninja

Photo Ninja is a RAW converter which, according to its website, 'delivers exceptional detail, outstanding image quality, and a distinctive, natural look.' It is not a comprehensive editing program but can be integrated with others. Cost is USD119 for a lifetime licence, including one year of upgrades.

Silkypix

Silkypix software is produced by a Japanese company which is involved with several camera manufacturers. Its current leading program Silkypix Developer Pro 11 costs 22000 JPY (about USD 164, AUD 245) and the

previous version Silkipix Developer Studio Pro 10 costs USD 37.00.

Silkipix also produces capable but less complex software for specific camera makes, including Panasonic, Pentax and Fujifilm. These programs are available free of charge with purchase of the relevant camera. It has been reported that Nikon development software is also produced by Silkipix.

Photopad

Photopad is a basic RAW converter and photo editor. A free version is available and a version with additional features costs. The 'Home' edition is USD 34.99 (but charged in AUD as it is produced by and Australian company, NCH).

Pixelmator Pro

Pixelmator Pro is an inexpensive but capable program for Mac systems only. It costs USD 39.99 but is sometimes available at a substantial discount.

Photopad (NCH Software)

Photopad is available as a free program with a number of useful features with additional features available through purchase of the premium version at a cost of US 39.99. It is able to open a large number of file formats, including RAW files. As a free version, it is a useful introductory program.

Camera manufacturers' proprietary software

Most if not all camera manufacturers include access to editing software specifically designed for editing the proprietary RAW images produced by their cameras, such as NEF (Nikon), and CR2 (Canon). This software includes many editing tools but is not as comprehensive as programs such as Photoshop and Lightroom.

Open-source, free programs

Comparison of open-source programs

There are several on-line reviews and comparisons of the major free programs, covering their strengths and weaknesses. Open-source programs are less memory-intensive than most commercial programs. If computer space permits, more than one program can be used.

GIMP (Gnu Image Manipulation Program)

GIMP is a comprehensive program for photo editing and image creation. It is open source and free and has most if not all of the features needed by the amateur photographer. New features are added regularly, some contained within the program and others available as plugins. While it has fewer features than Photoshop it has the advantage of requiring much less computer memory. There are several on-line articles comparing it with Photoshop. While these comparisons are helpful, there are some issues which need further explanation before deciding whether GIMP is an appropriate choice. For example, GIMP is NOT able to directly open RAW files. Other programs such as UfRAW, RawTherapee, or darktable (all free), Photopad (free as a basic program) or proprietary software provided by camera manufacturers must be used to open the RAW files, which can then be exported to GIMP. As some of these formats are lossless files such as TIFF, GIMP can be used without losing original data. One comparison article asserted that GIMP does not have a layers feature. This is not correct. GIMP also lacks a CMYK colour model, regarded as important for printing. However, there is a plug-in which converts RGB images to CMYK. Resources for using GIMP include context-sensitive help provided as part of the program, a number of books and many video tutorials.

darktable

While not as comprehensive as Photoshop/Lightroom, darktable is a RAW editor with a substantial set of editing tools offering a free alternative for the amateur photographer. It has a user guide and there are many

YouTube tutorials including a set of 92 videos by Australian photographer Bruce Williams.

Rawtherapee

Rawtherapee is another free program which can edit RAW files and includes over 70 modules offering a comprehensive range of editing tools, but currently lacks masking for local adjustments. Rawtherapee resources include an online and downloadable user manual and a number of videos.

digiKam

digiKam is a free and comprehensive photo editor. It has been criticised in the past for lack of stability but the latest version, 7.7, incorporates many improvements.

Lightzone

Formerly a commercial program, Lightzone is now a feature-rich free program. It has been described as ‘an application that makes processing and editing a less time-consuming and demanding task, without compromising functionality’. It lacks some of the features found in other free programs.

UFRaw/Nufraw/Photivo

UFRaw is an editor for RAW images with a limited range of functions and can be used as a stand-alone program or as a plug-in for more comprehensive programs such as GIMP. Nufraw is a fork from UFRaw, offering similar features and is also usable as a GIMP plug-in. Photivo is another free RAW editor with the ability to export files to GIMP.

Simple Programs

There are many programs for relatively simple editing of features such as exposure value, contrast, white balance, and saturation. These programs usually also include features such as crop, resize, and straightening. Some of these are free and some offer basic features free of charge with more advanced features at an additional cost.

Microsoft Photos

The Microsoft program 'Photos' which is packaged with all Microsoft Windows software includes controls for 'Light' (exposure value), 'Colour' (saturation) 'Clarity' (similar but not identical to a sharpness control), red-eye removal, spot fix, cropping (with control of aspect ratio), rotate, straightening (fine-tuned rotation), vignette, a variety of filters and text. It also allows for re-sizing (control of pixel count and file size), by clicking on the three dots at the top right of the window.

Photos for MacOS

This program offers basic photo editing for Mac users.

Specialist Programs

Some important editing functions and specialist applications were until recently confined to specialist programs and plug-ins but are now becoming more widely available in general editing programs. These include functions include denoising, sharpening, high dynamic range, focus stacking, and panoramas and resizing.

1. Denoising

Comprehensive photo editing software programs include denoising as part of the toolkit and these are often effective. Recent advances in artificial intelligence have resulted in outstanding specialist programs such as *Topaz Denoise AI*. It is available at USD 79.99 for a lifetime licence, which includes a year of free upgrades. Topaz Labs also has a program called Topaz AI which brings together its denoise, sharpening and upscaling functions.

2. Sharpening

Images can be unsharp as a result of focus problems or motion blur. Many software programs incorporate a variety of modules to increase actual or apparent sharpness. These include 'Unsharp Mask', 'High Pass', 'Equalizer' and 'Clarity'. Some programs have modules designed specifically for the different causes of lack of sharpness. Reviews of current software indicate that Photoshop and Lightroom have good sharpening capabilities. However, several current reviews recommend *Topaz Sharpen AI* as the most effective sharpening program. It is available at USD 79.99 as a stand-alone program or as a plugin for Photoshop and Lightroom and can also be bought as part of a larger package of Topaz software with denoise and other functions.

3. High Dynamic Range

Many photo editing programs include HDR modules. There are several commercial and free specialist programs such as Photomatix Pro 7 (AUD 129). The Aurora HDR program, previously available as a stand-alone or as a Lightroom plug-in has been incorporated into Luminar Neo as 'HDR Merge'. The Nik Collection (USD 149.00 for the complete collection) includes Nik HDR Efex Pro. Luminance HDR is a capable free program.

4. Focus Stacking

There are several specialist programs for focus stacking, including Helicon Focus and Zerene Stacker. Helicon is available in three versions, Lite, Pro and Premium, at USD 30, 55 and 65 respectively for a one-year licence or 115, 200 and 240 respectively for a life-time licence. These prices do not include tax. Zerene Stacker is available in Personal, Prosumer and Professional versions at USD 89, 189 and 289 respectively for life-time licences., including free upgrades. The two 'pro' versions can be used with Lightroom. Picolay is a free specialist focus stacking program.

Some general photo editing programs, including Photoshop, Lightroom, Affinity Photo and ON1 Photo RAW 2023, have added focus stacking modules.

5. Panoramas

Specialist panorama software includes Hugin (free), PTGui (USD 195) Panoweaver 10 (USD 399.95), Panorama Studio 3 (USD 39.95), Panorama Studio 3 Pro (USD 79.90), Panorama Stitcher, Photostitcher (USD 19.99), GigaPan Stitch, and Image Composite Editor (free). The more expensive programs include a wider range of capabilities. Photoshop and several other general-purpose programs now include panorama stitching.

6. Resizing

Most programs include a feature to downsize files for the purposes of sharing or competitions. Topaz Gigapixel is a specialist program which enables upscaling of images using artificial intelligence. This is also known as resampling. Topaz Labs describes it as an 'Exceptional AI image upscaler delivering enhanced detail and resolution by 600%'. Version 6.1 costs USD 99.99 and a free trial is available. Major commercial programs such as Photoshop and some free programs also offer upscaling.

Action Panels and Plug-ins

Photoshop has a feature which enables automation of some editing functions through the Actions Panel. This is similar to the 'macro' feature in other software. Information on this Action Panels can be found on the Adobe website at <https://helpx.adobe.com/photoshop/using/actions-actions-panel.html> and https://helpx.adobe.com/photoshop/using/creating-actions.html#creating_actions.

In addition, there are several externally developed Action Panels for Photoshop which can be added to

Photoshop as plug-ins.

A free Action Panel *Easy Panel 2.0*, can be found at <https://www.shutterevolve.com/free-easy-panel-for-photoshop/>. This panel covers luminosity masks, dodge-and-burn, sharpening and several other editing functions. The website also has links to video instructions and advertises more complex panels which are available for purchase.

Another Action Panel, known as *TK7* and also covering luminosity masking can be found at <https://goodlight.us/writing/actionspanelv7/tk7.html>. There is a free version and a more complex version costing USD 29. A pdf manual and video instructions are also available on the website.

Another set of valuable plug-ins, which are effectively Action Panels, are at: <https://adplumiflow.com/adp-lumiflow-luminosity-masks-plugin-for-photoshop/>. The *ADP Luminosity Panel 2.0 and Workflow Plugin* includes masking and several other editing functions. The *MonoFX Black and White Editing Plugin* is for monochrome processing.

There are many other plug-ins available for Photoshop and some other editing programs can open and produce PSD files, providing a degree of interoperability between different editing programs.

Many available plug-ins are compatible with versions of Photoshop dating from 2014 but not with older versions.