

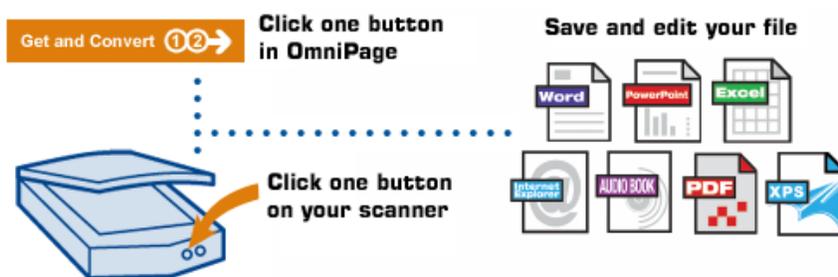
Title: **Universal Access using OCR with Printed Text**
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 Software: OCR (Optical Character Recognition) programs
 Category: Scanning devices OCR applications and access to text

1. Introduction

Optical Character Recognition (usually referred to simply as **OCR**) software has been used for many years in education, research and business. It provides access to text in all manner of printed materials. OCR software makes it easy to re-use and access existing printed or online documents with perfect formatting. Converted documents can look exactly like the original – complete with colour, columns, tables, bullets and graphics.

Optical character recognition 'is the mechanical or electronic translation of images of handwritten, typewritten or printed text (usually captured by a scanner) into machine-editable text.' [http://en.wikipedia.org/wiki/Optical_character_recognition]

Any scanning device can benefit from the power of unlocking and sharing information stored on paper as accurately reproduced digital documents. They can be reversioned as PDF, MS Word, HTML documents or purely as text. Various OCR programs provide the speed, accuracy, quality and features to maximise the benefits of current scanning or all-in-one devices.



Note: The device needs to be OCR capable or can save/convert a file in a format that can be used by scanning software.

With most flatbed scanners, photocopiers or printer-scanner models, converting information that was formerly 'locked' on paper or in digital files into a preferred format, is made simpler and easier than previously imagined. Just load the print material, convert it and students are ready to re-use it. Students and educators can edit the text, alter or enlarge the font, remove or reposition sections or have it voiced using text-to-speech programs or converted to braille. Files can be emailed, copied to USB drives, printed and stored for future reference or for other students' needs.

Students who find reading paper based material difficult or impossible, as well as vision impaired users, have a solution that can be portable using hand held scanners, or even mobile phones!



Printed material in libraries, especially books that are restricted or not-for-loan, can be accessed electronically with a camera or mobile phone and converted to text. 'CapturaTalk software - uses high quality, natural sounding voices to read text out loud captured either from a photograph or an electronic document.' [Source: <http://www.capturatal.com/>]. It will allow students to take a photo of some text on a page or in a newspaper or journal, and then CapturaTalk will then scan the photograph, recognise the text using the OCR and read the information aloud to them with the text-to-speech function. A portable, socially acceptable and functional solution!

Even TopOCR, a free portable OCR application in AccessApps, runs from a USB memory stick or thumb drive. Simply capture a photo with text, send the file to a computer, run AccessApps and start TopOCR software. Load the file and it will not only convert the text but also read it out aloud. AccessApps is freely available to download and use: <http://www.rsc-ne-scotland.ac.uk/accessapps/>.

2. Background to OCR and Scanners

Optical character recognition (using optical techniques such as mirrors and lenses) and digital character recognition (using scanners and computer algorithms) were originally considered separate fields. Because very few applications survive that use true optical techniques, the OCR term has now been broadened to include digital image processing as well.

Early systems required training (the provision of known samples of each character) to read a specific font. "Intelligent" systems with a high degree of recognition accuracy for most fonts are now common. Some systems are even capable of reproducing formatted output that closely approximates the original scanned page including images, columns and other non-textual components.

In 1974, Ray Kurzweil started the company *Kurzweil Computer Products, Inc.* and led development of the first omni-font optical character recognition system - a computer program capable of recognizing text printed in any normal font. He decided that the best application of this technology would be to create a reading machine for the blind, which would allow blind people to understand written text by having a computer read it to them out loud. However, this device required the invention of two enabling technologies--the CCD flatbed scanner and the text-to-speech synthesizer. [Source: http://en.wikipedia.org/wiki/Optical_character_recognition] The application of OCR has broadened far more widely than he would ever have considered. The industrial use of OCR has other implications and uses, whilst in education it has significant benefits to a wide range of students in order to meet multiple needs.

3. Scanners – Handheld, Portable and Flatbed devices

The type of scanner most commonly sold to homes, schools and businesses is referred to as an *A4 flatbed scanner*. There is a wide market for these scanners and, as such, there is a wide range of products available, priced from under \$100 to many thousands of dollars. The under-\$1000 market is very popular in the home and small business environments and provides a diverse variety of scanner products to the market from dozens of different vendors.



In education, scanners have been popularly used to acquire maps, drawings, slides, photographs and other images in art and design departments and science laboratories. Teachers have purchased them predominantly for these purposes whereas in the past 10 years, some educators in special needs departments have been accessing text using the OCR capabilities. Scanning technology is available in numerous devices, from the enterprise wide

photocopiers that can broadcast and copy/send content o school servers and intranets, to scanner/printers with phone and fax capabilities, to stand alone desktop and portable scanners, even to applications that operate on PDAs and mobile phones.

a. Scanner Set-up

Users need to install a 'driver' program so that their scanning device will work with their computer and scanning software. Virtually all scanners come with TWAIN drivers, which most scanning applications support. High-speed document scanners usually come with ISIS drivers, which tend to be more standardized and offer better performance with faster scanner models. Many production-scanning applications use ISIS drivers.



The driver usually comes packaged on a CD or DVD with the device (i.e. the dedicated scanner, printer-scanner, photocopier or other device). If this cannot be located, most manufacturers provide free support with the appropriate driver software on their web site. It is simply a matter of locating the appropriate driver and installing it onto a desktop computer or Notebook.

b. Scanner Specifications

Scanner specifications vary model by model. It depends on what you want to achieve and the most common tasks that will be performed.

- Workload - estimate the number of daily scans you need to make to find scanners that meet high demand
- Duplex - scans both sides of the page at once for 2-sided documents, ideal for books and high volume scanning
- Colour - colour scanning as well as greyscale and black & white scanning
- Flatbed - is a flatbed or has a flatbed surface. Hinged lids provide for large books and texts.
- ADF - has a document feeder only
- Multi-Feed - uses Ultrasonic Multi-Feed Detection to prevent missed pages
- Auto-Crop - the ability to automatically detect the sizes of mixed pages
- Imprint - scanners that offer built-in or optional imprinter/endorser units
- Paper Size - maximum paper size (some devices will scan up to A3 in size)
- Feeder Capacity - maximum number of pages that you can store and use in the paper feeder
- Interface Type - connection to the computer, most commonly USB, formerly parallel or SCSI
- DPI – DPI or dots per inch, referred originally to the ability of phototypesetting image setters to write small details and smooth looking type. Today this phrase refers to how many pixels one has, which is image structure (defined below) and not resolution.
- Resolution is the finest detail between which a scanner can see
- Image Structure - refers to how many pixels an image have.
- TWAIN – a standard used by many programs to ‘acquire’ an image



4. Scanning Text using Different Formats

Capturing an image can be performed in a number of ways. The Dots per Inch (dpi) is an important consideration as the file size grows exponentially with more ‘dots’. Increased resolution means greater clarity and usually improved performance and accuracy. Scanning in greyscale may result in better overall recognition than in colour. Some paper or material (e.g. magazines) may cause problems with glossy surfaces. These are issues that require attention and some scrutiny when first experimenting and using OCR software

The most likely formats that will enable students to work with text in meaningful ways include:

Text	Pre text that can be opened in Notepad or WordPad or other text editing programs
Large Print	Using a variety of software programs with text-to-speech (<i>ReadPlease 2003</i>)
MP3 or Audio format	Edited in a text editor and then converted to a sound format (<i>TextAloud</i>) such as MP3
MS Word	Edited in versions of <i>MS Word</i> , <i>MS Works</i> , <i>Open Office Org</i> or other word processing programs
PDF	This can be a useful format but has some restrictions in <i>Adobe Reader</i> or <i>Foxit Reader</i>
HTML	Ready to edit in a variety of programs and FTP'd to web sites and Intranets
Proprietary Programs	For use in publishing programs or art and design software
Braille	For users who require tactile format in braille

5. Commercial and Free Software that Perform OCR

There are two OCR applications that compete for the title of most accurate. These are *Nuance OmniPage* and *ABBYY FineReader*. Which application is more accurate often depends on the specific documents in question. One application may handle a particular type of page layout better than the other. With the almost infinite variety of document layouts, fonts, table structures and other variables it is impossible to say that one application will always be better than the other. TextHELP has chosen *ABBYY FineReader* over *OmniPage* to be included in its *Read & Write* software.



ABBYY FineReader reputedly provides a more consistent formatting for fonts, bold and italics. Documents OCR'd with *OmniPage* are more likely to have variations in darkness recognized as bold or italic. This does not speak directly to the accuracy of the underlying text, but having to correct a great deal of formatting is a significant task for those seeking to recreate Word documents from a scan.

Over a large sample of documents, both products offer very comparable accuracy. However *Abbey FineReader* seems to be the premier application due to their superior customer service. Scanners and printer-scanners must be *OCR capable*. Some are more reliable and faster than others in their operation. Software that is 'bundled' with the device is usually a 'lite' version. It is still functional and useful but is not the full version of that company's software.

Commercial OCR Software:

OmniPage V16	http://australia.nuance.com/omnipage/standard/Abbey
ABBYY FineReader	http://www.abbyy.com/company/
Readiris Pro 11	http://www.irislink.com/c2-209-225/Readiris-for-Windows.aspx
Readsoft	http://www.readsoft.com/ (more business oriented application)
MS Office OneNote 2007	http://office.microsoft.com/en-gb/onenote/default.aspx
CuneiForm Pro 6	http://www.ocr.com/ (shareware)
PaperPort Deluxe V11	http://www.nuance.com/paperport/ - ideal for working electronically with scanned documents – it will read and work with PDF and TIFF files. It is ideal for users who have physical disabilities and who need to work directly with documents.

OCR Freeware and web services:

SimpleOCR	http://www.simpleocr.com/ - a very useful free program with some great features
FreeOCR V2.6	http://www.softi.co.uk/freeocr.htm
TopOCR	http://www.topocr.com/ - for digital cameras and phones – a portable version is also available in AccessApps - http://www.rsc-ne-scotland.ac.uk/accessapps/
Microsoft Office Document Imaging	In Office 2003 and 2007, as part of the Microsoft Tools

Web sites can also be used to convert files, rather than scanning them. People often wonder why you might want to scan an electronic file – but it is required when you wish to obtain just the text and dismiss the graphics or reversion it for the web. A useful site is Zamzar (www.zamzar.com). You can elect to convert one or more files from one format to the other e.g. MS Word to PDF or PDF to HTML. The file(s) can be up to 100MB and it is a free service. By nominating an email address the converted file or files are emailed to the user after a time period.

The screenshot shows a web interface for file conversion with four steps:

- Step 1:** Select files or [URL](#) to convert (up to 100MB - [want more ?](#)). Includes a text input field and a "Browse..." button.
- Step 2:** Choose the format to convert to: Includes a dropdown menu labeled "Convert file(s) to:".
- Step 3:** Enter your email address to receive converted files: Includes a text input field.
- Step 4:** Convert (by clicking you agree to our [Terms](#)): Includes a "Convert" button.

It is ideal when users do not possess or have relevant software on the machine that is being used. For example, accessing the text from an *MS Publisher* file so as to study or read it using text to speech software. Even without MS Publisher, the user can obtain access to the contents in another more user or accessibility friendly format.

6. Assistive Software to Access Scanned Documents

Programs that make the entire process easier and more accessible for students include *textHELP Read & Write V9*; (www.texthelp.com or www.spectronicsinoz.com) *ClaroRead for PC 2008* (<http://www.clarosoftware.com/> or www.spectronicsinoz.com); *Kurweil 3000* (<http://www.kurzweilededu.com/>) and *Wynn Wizard* from Scientific software (<http://www.freedomscientific.com/LSG/products/WYNN.asp> or locally from <http://www.quantech.com.au/wynn>).

These software programs all provide quick and elegant access to print materials together with learning supports, including spell checking, thesaurus and dictionaries, text to speech with human sounding voices, text-to-audio conversion and many other visual and auditory features.

7. Universal Access using OCR

Previously, students who could not read at all, read fluently or comprehend print material due to the complexity or use of terms and language were severely disadvantaged. Equitable access to reading precluded them from enjoying printed text. Someone in their family, or an aide or other educator or therapist would have to read content to them, sometimes their own work! Scanning using OCR provides independence. It also allows print-disabled, blind and vision impaired users the opportunity to read anything, anywhere using hand held scanners and adapted mobile phones.

Students can function in a text rich society where reading and writing is seen as being paramount to study and employment. Scanners can be made part of the school's photocopying provision, or provided as a set of stand-alone scanners in classrooms, libraries computer labs or study hubs or as combined inkjet or laser printer/scanners.

Students should have study notes, fact sheets, instructions and course content delivered to them as part of eLearning on school or TAFE/University Intranets or in folders on relevant servers. Otherwise, content can be given electronically in MS Word, PDF or HTML on USB thumb drives or on CDs.

8. In Conclusion

This article is a brief discussion into some of the issues raised when speaking about OCR and its implications for learning. Students need access to data and literature, whether it is for fun, leisure, research, and study purposes or for daily living.

Scanning a label on a can of soup, or a packet of goods in a supermarket and having a hand-held scanning device read the small print is extremely liberating for people. Scanning a newspaper and listening to an article assists the elderly and vision impaired. Being able to scan a worksheet and complete it on a Notebook computer and then email or print a hard copy for proof reading or assessment should be commonplace in our schools and Universities for our students.

Regrettably, many staff members in our learning institutions are unaware of the potential of OCR or relegate it to the "special needs" teachers and aides. The power and functionality of OCR should not be relegated to a niche audience. Educators need to be made aware of its advantages and how it can be gainfully deployed in all areas of study and learning. Scanning equipment and OCR should be regarded as universally applicable technology and be promoted to and made available by all users and be provided where and when it is required.

Resources:

A very useful article is one written by E.A. Draffan – 'Alternative formats One Year On' which can be located at: <http://www.altformat.org/index.asp?pid=233&ipname=AU>. This is a comprehensive article as well as other discussions on alternate text for learning as well as up-to-date resources, papers and web links.

Assistive Technology for Learning Disabilities at ANU has some excellent background material and links to suppliers and providers - http://www.anu.edu.au/disabilities/atproject/learning_disabilities/at_learning_disabilities.php.

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