

# Optical character recognition

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**Optical character recognition** (**optical character reader**, **OCR**) is the [mechanical](#) or [electronic](#) conversion of [images](#) of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example from a television broadcast).<sup>[1]</sup> It is widely used as a form of data entry from printed paper data records, whether passport documents, invoices, bank statements, computerised receipts, business cards, mail, printouts of static-data, or any suitable documentation. It is a common method of digitising printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as [cognitive computing](#), [machine translation](#), (extracted) [text-to-speech](#), key data and [text mining](#). OCR is a field of research in [pattern recognition](#), [artificial intelligence](#) and [computer vision](#).

Early versions needed to be trained with images of each character, and worked on one font at a time. Advanced systems capable of producing a high degree of recognition accuracy for most fonts are now common, and with support for a variety of digital image file format inputs.<sup>[2]</sup> Some systems are capable of reproducing formatted output that closely approximates the original page including images, columns, and other non-textual components.

## History

Early optical character recognition may be traced to technologies involving telegraphy and creating reading devices for the blind.<sup>[3]</sup> In 1914, [Emanuel Goldberg](#) developed a machine that read characters and converted them into standard telegraph code.<sup>[citation needed]</sup> Concurrently, Edmund Fournier d'Albe developed the [Optophone](#), a handheld scanner that when moved across a printed page, produced tones that corresponded to specific letters or characters.<sup>[4]</sup>

In the late 1920s and into the 1930s [Emanuel Goldberg](#) developed what he called a "Statistical Machine" for searching microfilm archives using an optical code recognition system. In 1931 he was granted USA Patent number 1,838,389 for the invention. The patent was acquired by [IBM](#).

With the advent of smart-phones and smart-glasses, OCR can be used in internet connected mobile device applications that extract text captured using the device's camera. These devices that do not have OCR functionality built-in to the operating system will typically use an OCR [API](#) to extract the text from the image file captured and provided by the device.<sup>[5][6]</sup> The OCR API returns the extracted text, along with information about the location of the detected text in the original image back to the device app for further processing (such as text-to-speech) or display.