



وزارة التعليم العالي والبحث العلمي

جامعة القادسية

كلية علوم الحاسوب وتكنولوجيا المعلومات

CONVERT HAND WRITING TO TEXT

مشروع بحث تقدم به كل من الطلبة

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إلى كلية علوم الحاسوب و تكنولوجيا المعلومات كجزء من متطلبات نيل شهادة
البكالوريوس

بإشراف

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2017 م

الخلاصة

عبارة عن نظام لتحويل الكتابة الموجودة في الصورة عن طريق النقاط الصورة عبر كامرة الحاسوب الى كتابة نصية النظام هو عبارة عن تطبيق ويب يمكن تشغيله من متصفح الحاسوب الخاص بك بعد تشغيل النظام يطلب منك الصلاحية لتشغيل كامرة الحاسوب لكي تستخدمها في النقاط الصورة وبعد ذلك يتم تحويل النص المراد تحويله الى كتابة محرره يحتوي النظام على ادارة التلاعب في ادارة اللوان الصورة لكي يتم توضيح الكتابة التي تضررت بسبب الاضاءة او كامرة الحاسوب وان النظام مبني على لغات البرمجة **html** الجافا سكربت ويمتاز النظام بسهولة استخدامه

CHAPTER ONE

1-1 OCR:

As you read these words on your computer screen, your eyes and brain are carrying out optical character recognition without you even noticing! Your eyes are recognizing the patterns of light and dark that make up the characters (letters, numbers, and things like punctuation marks) printed on the screen and your brain is using those to figure out what I'm trying to say (sometimes by reading individual characters but mostly by scanning entire words and whole groups of words at once).{1}

Computers can do this too, but it's really hard work for them. The first problem is that a computer has no eyes, so if you want it to read something like the page of an old book, you have to present it with an image of that page generated with an optical scanner or a digital camera. The page you create this way is a graphic file (often in the form of a JPG) and, as far as a computer's concerned, there's no difference between it and a photograph of the Taj Mahal or any other graphic: it's a completely meaningless pattern of pixels (the colored dots or squares that make up any computer graphic image). In other words, the computer has a picture of the page rather than the text itself—it can't read the words on the page like we can, just like that. OCR is the process of turning a picture of text into text itself—in other words, producing something like a TXT or DOC file from a scanned JPG of a printed or handwritten page. {1}

1-2 the advantage of OCR:

Once a printed page is in this machine-readable text form, you can do all kinds of things you couldn't do before. You can search through it by keyword (handy if there's a huge amount of it), edit it with a word processor, incorporate it into a Web page, compress it into a ZIP file and store it in much less space, send it by email—and all kinds of other neat things. Machine-readable text can also be decoded by screen readers, tools that use speech synthesizers (computerized

voices, like the one Stephen Hawking uses) to read out the words on a screen so blind and visually impaired people can understand them. (Back in the 1970s, one of the first major uses of OCR was in a photocopier-like device called the Kurzweil Reading Machine, which could read printed books out loud to blind people.)

1-3 How does OCR work:

Let's suppose life was really simple and there was only one letter in the alphabet: A. Even then, you can probably see that OCR would be quite a tricky problem—because every single person writes the letter A in a slightly different way. Even with printed text, there's an issue, because books and other documents are printed in many different typefaces (fonts)(1 - 1) and the letter A can be printed in many subtly different forms.

Broadly speaking, there are two different ways to solve this problem, either by recognizing characters in their entirety (pattern recognition) or by detecting the individual lines and strokes characters are made from (feature detection) and identifying them that way. Let's look at these in turn.



(1-1)

Photo: There's a fair bit of variation between these different versions of a capital letter A, printed in different computer fonts, but there's also a basic similarity:

you can see that almost all of them are made from two angled lines that meet in the middle at the top, with a horizontal line between. {1}

Pattern recognition

Examples (1 - 2) of text and numbers printed in 1960s OCR-A optical character recognition font.

Explain
that
Stuff!
01234567890

(1 - 2)

If everyone wrote the letter A exactly the same way, getting a computer to recognize it would be easy. You'd just compare your scanned image with a stored version of the letter A and, if the two matched, that would be that. Kind of like Cinderella: "If the slipper fits..."

So how do you get everyone to write the same way? Back in the 1960s, a special font called OCR-A was developed that could be used on things like bank checks and so on. Every letter was exactly the same width (so this was an example of what's called a monospace font) and the strokes were carefully designed so each letter could easily be distinguished from all the others. Check-printers were designed so they all used that font, and OCR equipment was designed to recognize it too. By standardizing on one simple font, OCR became a relatively easy problem to solve. The only trouble is, most of what the world prints isn't written in OCR-A—and no-one uses that font for their handwriting! So the next step was to teach OCR programs to recognize letters written in a number of very common fonts (ones like Times, Helvetica, Courier, and so on). That meant they

could recognize quite a lot of printed text, but there was still no guarantee they could recognize any font you might send their way.

1-4 Feature detection :

How the letter A is built from three separate features.



Also known as feature extraction or intelligent character recognition (ICR), this is a much more sophisticated way of spotting characters. Suppose you're an OCR computer program presented with lots of different letters written in lots of different fonts; how do you pick out all the letter As if they all look slightly different? You could use a rule like this: If you see two angled lines that meet in a point at the top, in the center, and there's a horizontal line between them about halfway down, that's a letter A. Apply that rule and you'll recognize most capital letter As, no matter what font they're written in. Instead of recognizing the complete pattern of an A, you're detecting the individual component features (angled lines, crossed lines, or whatever) from which the character is made. Most modern omnifont OCR programs (ones that can recognize printed text in any font) work by feature detection rather than pattern recognition. Some use neural networks (computer programs that automatically extract patterns in a brain-like way).

1-5 How does handwriting recognition work:

Recognizing the characters that make up neatly laser-printed computer text is relatively easy compared to decoding someone's scribbled handwriting. That's the kind of simple-but-tricky, everyday problem where human brains beat clever computers hands-down: we can all make a rough stab at guessing the message hidden in even the worst human writing. How? We use a combination of automatic pattern recognition, feature extraction, and—absolutely crucially—knowledge about the writer and the meaning of what's being written ("This letter,

from my friend Harriet, is about a classical concert we went to together, so the word she's written here is more likely to be 'trombone' than 'tramline'.")

1-6 Making it easy:

Where computers do have to recognize handwriting, the problem is often simplified for them. For example, mail-sorting computers generally only have to recognize the zipcode (postcode) on an envelope, not the entire address. So they just have to identify a relatively small amount of text made only from basic letters and numbers. People are encouraged to write the codes legibly (leaving spaces between characters, using all uppercase letters) and, sometimes, envelopes are preprinted with little squares for you to write the characters in to help you keep them separate.(1-3)



(1 - 3)

Forms designed to be processed by OCR sometimes have separate boxes for people to write each letter in or faint guidelines known as comb fields, which encourage people to keep letters separate and write legibly. (Generally the comb fields are printed in a special color, such as pink, called a dropout color, which can be easily separated from the text people actually write, usually in black or blue ink.)

Tablet computers and cellphones that have handwriting recognition often use feature extraction to recognize letters as you write them. If you're writing a letter A, for example, the touchscreen can sense you writing first one angled line, then the other, and then the horizontal line joining them. In other words, the computer gets a headstart in recognizing the features because you're forming them separately, one after another, and that makes feature extraction much easier than having to pick out the features from handwriting scribbled on paper.

1-7 Who invented OCR :

Most people think getting machines to read human text is a relatively recent innovation, but it's older than you might suppose. Here's a whistle-stop tour through OCR history:

1928/9: Gustav Tauschek of Vienna, Austria patents a basic OCR "reading machine." Paul Handel of General Electric files a patent for a similar system in the United States in April 1931. Both are based on the idea of using light-detecting photocells to recognize patterns on paper or card. {2}

1949: L.E. Flory and W.S. Pike of RCA Laboratories develop a photocell-based machine that can read text to blind people at a rate of 60 words per minute. (Read all about it in the February 1949 issue of Popular Science.)

1950: David H. Shepard develops machines that can turn printed information into machine-readable form for the US military and later founds a pioneering OCR company called Intelligent Machines Research (IMR). Shepherd also develops a machine-readable font called Farrington B (also called OCR-7B and 7B-OCR), now widely used to print the embossed numbers on credit cards.

1960: Lawrence (Larry) Roberts, a computer graphics researcher working at MIT, develops early text recognition using specially simplified fonts such as OCR-A. He later becomes one of the founding fathers of the Internet.

1950s/1960s: Reader's Digest and RCA work together to develop some of the first commercial OCR systems.

1960s: Postal services around the world begin to use OCR technology for mail-sorting. They include the US Postal Service, Britain's General Post Office (GPO, now called Royal Mail), Canada Post, and the German Deutsche Post. Helped by companies such as Lockheed Martin, postal services remain at the forefront of OCR research to this day.

1974: Raymond Kurzweil develops the Kurzweil Reading Machine (KRM) that combines a flatbed scanner and speech synthesizer in a machine that can read printed pages aloud to blind people. Kurzweil's OCR software is acquired by Xerox and marketed under the names ScanSoft and (later) Nuance Communications.

1993: The Apple Newton MessagePad (PDA) is one of the first handheld computers to feature handwriting recognition on a touch-sensitive screen. During the 1990s, handwriting recognition becomes an increasingly popular feature on cellphones, PDAs (notably the pioneering Palm and PalmPilot), and other handhelds.

2000: Researchers at Carnegie Mellon University flip the problem of developing a good OCR system on its head—and develop a spam-busting system called CAPTCHA (see caption below).

CHAPTER TWO

2-1 JavaScript :

JavaScript is a cross-platform, object-oriented scripting language. It is a small and lightweight language. Inside a host environment (for example, a web browser), JavaScript can be connected to the objects of its environment to provide programmatic control over them. {3}

JavaScript contains a standard library of objects, such as Array, Date, and Math, and a core set of language elements such as operators, control structures, and statements. Core JavaScript can be extended for a variety of purposes by supplementing it with additional objects; for example:

Client-side JavaScript extends the core language by supplying objects to control a browser and its Document Object Model (DOM). For example, client-side extensions allow an application to place elements on an HTML form and respond to user events such as mouse clicks, form input, and page navigation.

Server-side JavaScript extends the core language by supplying objects relevant to running JavaScript on a server. For example, server-side extensions allow an application to communicate with a database, provide continuity of information from one invocation to another of the application, or perform file manipulations on a server.

2-2 HTML :

HTML is a computer language devised to allow website creation. These websites can then be viewed by anyone else connected to the Internet. It is relatively easy to learn, with the basics being accessible to most people in one sitting; and quite powerful in what it allows you to create. It is constantly undergoing revision and evolution to meet the demands and requirements of the growing Internet audience under the direction of the » W3C, the organisation charged with designing and maintaining the language. {4}

The definition of HTML is HyperText Markup Language.

HyperText is the method by which you move around on the web — by clicking on special text called hyperlinks which bring you to the next page. The fact that it is hyper just means it is not linear — i.e. you can go to any place on the Internet whenever you want by clicking on links — there is no set order to do things in.

Markup is what HTML tags do to the text inside them. They mark it as a certain type of text (italicised text, for example).

HTML is a Language, as it has code-words and syntax like any other language.

2-3 Anything HTML can't do:

Of course, but since making websites became more popular and needs increased many other supporting languages have been created to allow new stuff to happen, plus HTML is modified every few years to make way for improvements.

Cascading Stylesheets are used to control how your pages are presented, and make pages more accessible. Basic special effects and interaction is provided by JavaScript, which adds a lot of power to basic HTML. Most of this advanced stuff is for later down the road, but when using all of these technologies together, you have a lot of power at your disposal.

2-4 Camera Control with HTML :

Client-side APIs on mobile and desktop devices are quickly providing the same APIs. Of course our mobile devices got access to some of these APIs first, but those APIs are slowly making their way to the desktop. One of those APIs is the getUserMedia API, providing developers access to the user's camera.

2-5 .js Ocrad:

Ocrad is an optical character recognition program, and part of the GNU Project. It is free software, and is licensed under the GNU GPL.

Based on a feature extraction method, it reads images in portable pixmap formats known as Portable anymap, and produces text in byte (8-bit) or UTF-8 formats. Also included is a layout analyser, able to separate the columns or blocks of text normally found on printed pages.

2-6 Web browser :

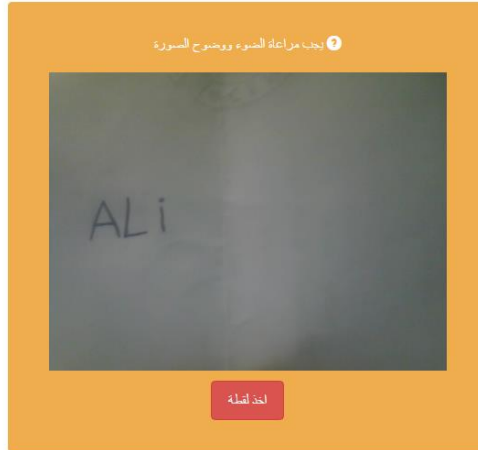
A web browser (commonly referred to as a browser) is a software application for retrieving, presenting and traversing information resources on the World Wide Web. An information resource is identified by a Uniform Resource Identifier (URI/URL) that may be a web page, image, video or other piece of content. {5} Hyperlinks present in resources enable users easily to navigate their browsers to related resources.

Although browsers are primarily intended to use the World Wide Web, they can also be used to access information provided by web servers in private networks or files in file systems.

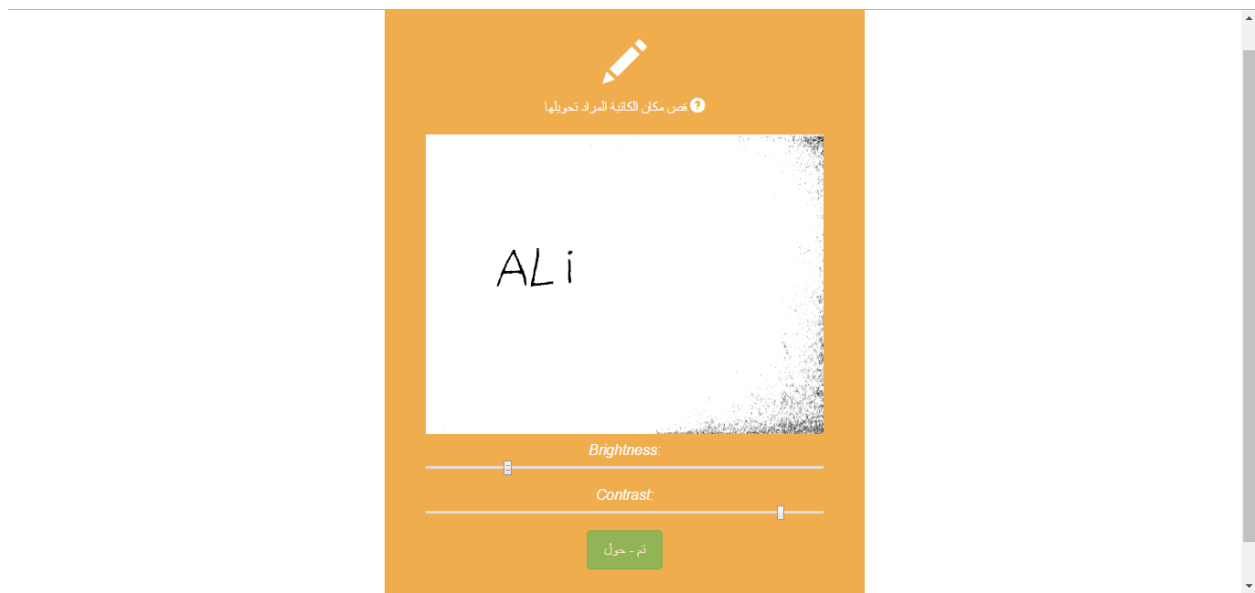
CHAPTER THREE

3-1 work steps

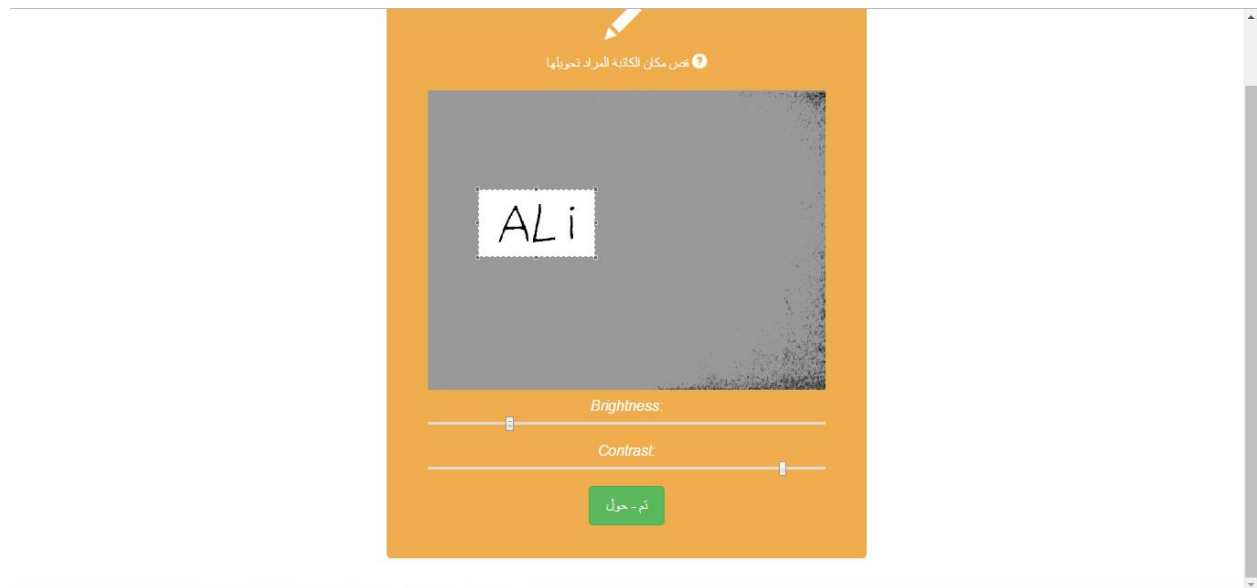
1- Main page (Take photo to words)



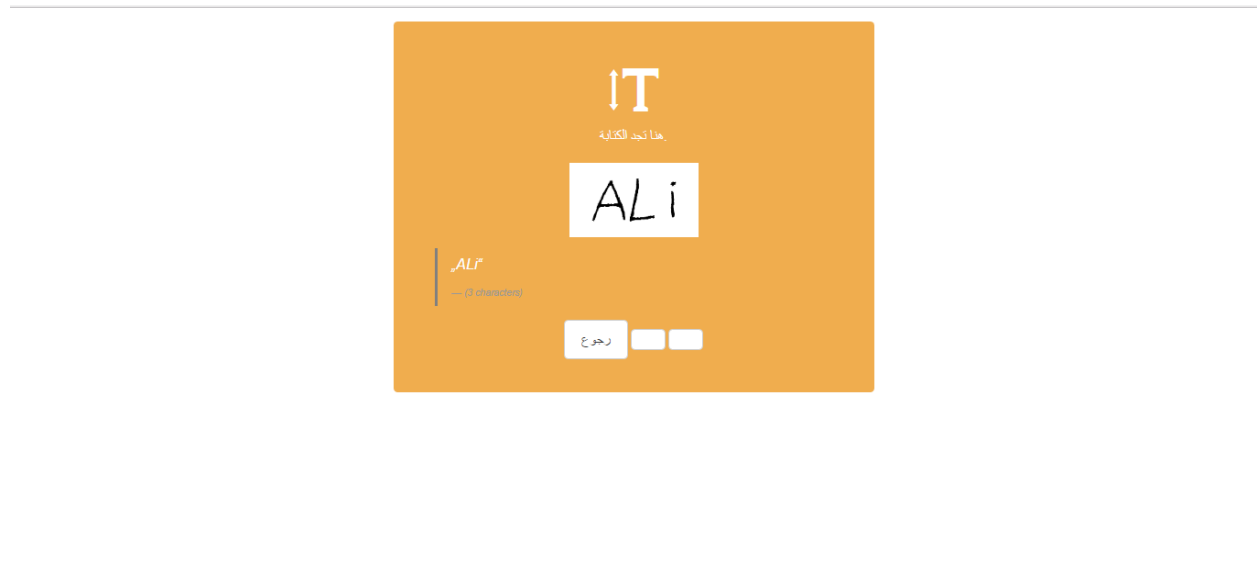
2- Adjust the brightness ratio if it is not clear



3- Select the word to be convert



4- The final result



"ALI" - 3 Character

Resources

{1} , {2} OCR Text Processing (Business Professional). Book 1, Level 2. Text Production, Word Processing Authors : Beverley Loram, Jean Ray, Pam Smith, Sarah C. Wareing, Jane Quibell, Lesley Dakin, Rosalind Buxton

{3} Book : The Good Parts Author: Douglas Crockford Year: 2008

{4}Book : Dynamic HTML Unleashed Author: L. Michael Van Hoozer Year:2000

{5} Book : Web browser Wikipedia book