

DECLARATION OF MEIHUA SHI

I, Meihua Shi, pursuant to 28 U.S.C. § 1746 and 37 C.F.R. § 1.68, hereby declare as follows:

1. I am a Translator for Nelles Translations.
2. I submit this declaration to certify the accuracy of the English translation of Chinese Patent Application Publication CN 1967565A to Zhu et al.
3. I am qualified to perform Chinese to English translations and certify the accuracy of Chinese to English translations.
4. My statements are based on personal knowledge and my review of Chinese Patent Application Publication CN 1967565A to Zhu et al. and its Chinese to English translation. If called as a witness about the facts contained in these statements, I could testify competently based on such personal knowledge and the investigation I have conducted.
5. Attached as **Exhibit A** is a true and accurate copy of Chinese Patent Application Publication CN 1967565A to Zhu et al.
6. Attached as **Exhibit B** is a true and accurate copy of an English translation of Chinese Patent Application Publication CN 1967565A to Zhu et al. (hereinafter, “Zhu Translation”), which I have reviewed based on Exhibit A and my personal knowledge of the Chinese and English languages.
7. Zhu Translation is a true and accurate translation of Chinese Patent Application Publication CN 1967565A to Zhu et al. from Chinese to English.
8. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true.

9. I have been warned and am aware that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

10. I understand that by submitting this declaration I may be asked to appear for a deposition asking me questions limited to the material in my declaration. With my signature below, I agree to make reasonable efforts to make myself available for such a deposition at a reasonable place and time.

* * *

I declare under the penalty of perjury that the foregoing is true and correct. Executed on July 23, 2025 in New York.

A handwritten signature in cursive script that reads "Meihua Shi".

Meihua Shi

EXHIBIT A

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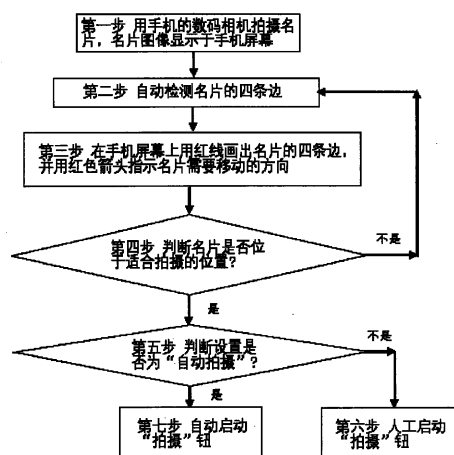
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[54] 发明名称

一种用带数码相机的手机实现名片扫描的方法

[57] 摘要

一种用带数码相机的手机实现名片扫描的方法，属手机应用的技术领域，该方法用所述的手机将名片所载的诸如姓名、地址之类的有用信息直接添加到手机的地址簿中，包括用手机拍摄名片的步骤：在手机的屏幕上检测待摄名片的四条边，用一种颜色的线画出检测到的待摄名片的四条边，使手机用户看清名片在屏幕上的位置和形状，并根据名片的当前位置用箭头提示手机用户沿箭头所指方向移动名片，至名片进入适合拍摄的位置；当名片位于适合拍摄的位置时，所述的名片的四条边变为第二种颜色，提示手机用户拍摄准备就绪；手机用户只需稳稳握住手机，人工或手机自动启动“拍摄”钮，完成待摄名片的拍摄，从而克服了拍摄时相机易发生抖动的弊病。



1、一种用带数码相机的手机实现名片扫描的方法，包括四个步骤：

（1）用手机自带的数码相机拍摄待摄名片的图像；（2）用 OCR 技术自动识别（1）步摄得的待摄名片图像中的文字；（3）用文本分类技术自动找出（2）步识别的文字中的诸如姓名、地址、邮编、电话号码、传真号码、电子邮箱地址之类的有用信息，并将它们作为识别结果显示于所述的手机的屏幕；（4）手机用户对识别结果进行校核，经改错和确认后，手机自动将确认的识别结果添加到所述的手机的地址簿中，该方法需在带数码相机的手机内施行，在所述的手机内有含单片机系统的拍摄系统和名片识别系统，在所述的单片机系统的存储器中存储有以下程序，控制和指挥 CPU 执行以下确保该方法能正常施行的操作：待摄名片的影像显示于所述的屏幕，角点显示于所述的屏幕，判定待摄名片的边缘，用第一种颜色画线，用第一种颜色画箭头，判定待摄名片的角的顶点与角点的重合，用第二种颜色画线，启动“拍摄”钮，其特征在于，（1）步中，所述的手机内的拍摄系统按以下步骤拍摄待摄名片的图像：

第一步，将所述的手机自带的数码相机的镜头对准待摄名片，所述的拍摄系统将待摄名片的影像显示在所述的手机的屏幕上，并在所述的屏幕上的靠近四角的地方分别显示四个角点，提示手机用户待摄名片处于适合拍摄位置时待摄名片的四个角的顶点应分别与所述的四个角点重合；

第二步，所述的拍摄系统自动检测待摄名片的四条边；

第三步，在所述的屏幕上用第一种颜色的线画出第二步检测到的待摄名片的四条边，并用第一种颜色的指示箭头指示待摄名片应该移动的方向；

第四步，所述的拍摄系统检查待摄名片是否位于适合拍摄位置，如不，返回并执行第二步，如是，在所述的屏幕上用第二种颜色的线画出待摄名片的四条边，提示手机用户待摄名片位于适合拍摄的位置，可以拍摄，进入并执行第五步；

第五步，手机用户判别手机的拍摄设置，如为“人工拍摄”，进入并执行第六步，如为“自动拍摄”，进入并执行第七步；

第六步，手机用户稳稳握住手机，按所述的手机的“拍摄”钮，得到

待摄名片的影像；

第七步，所述的拍摄系统自动启动所述的手机的“拍摄”钮，得到待摄名片的影像。

2、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色。

3、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕。

4、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，该方法在具有以下技术指标的带数码相机的手机内施行：

手机的牌号：多普达 830 型；

数码相机的分辨率：2Mpix.；

CPU 工作频率：195MHz；

单片机系统内的存储器容量：44Mbit；

屏幕对角线长度：2.8in.；

屏幕分辨率：320*240 pix.；

手机操作系统：微软的 windows mobile 5.0。

5、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色，在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕。

6、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色，该方法在具有以下技术指标的带数码相机的手机内施行：

手机的牌号：多普达 830 型；

数码相机的分辨率：2Mpix.；

CPU 工作频率：195MHz；

单片机系统内的存储器容量：44Mbit；

屏幕对角线长度：2.8in.；

屏幕分辨率：320*240 pix.；

手机操作系统：微软的 windows mobile 5.0。

7、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕，该方法在具有以下技术指标的带数码相机的手机内施行：

手机的牌号：多普达 830 型；

数码相机的分辨率：2Mpix.；

CPU 工作频率：195MHz；

单片机系统内的存储器容量：44Mbit；

屏幕对角线长度：2.8in.；

屏幕分辨率：320*240 pix.；

手机操作系统：微软的 windows mobile 5.0。

8、根据权利要求 1 所述的用带数码相机的手机实现名片扫描的方法，其特征在于，第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色，在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕，该方法在具有以下技术指标的带数码相机的手机内施行：

手机的牌号：多普达 830 型；

数码相机的分辨率：2Mpix.；

CPU 工作频率：195MHz；

单片机系统内的存储器容量：44Mbit；

屏幕对角线长度：2.8in.；

屏幕分辨率：320*240 pix.；

手机操作系统：微软的 windows mobile 5.0。

一种用带数码相机的手机实现名片扫描的方法

技术领域

本发明涉及一种用带数码相机的手机实现名片扫描的方法，属手机应用的技术领域。

背景技术

目前手机自带数码相机越来越普及，且数码相机的分辨率也越来越高。这就为带数码相机的手机作名片扫描的应用创造了条件。

名片扫描技术指用带数码相机的手机将名片所载的诸如姓名、地址、邮编、电话号码、传真号码、电子邮箱地址之类的有用信息直接添加到手机的地址簿中的技术。与传统的利用扫描仪来扫描名片的方法相比，该技术的最大好处是上述的添加有用信息的任务，靠手机及其自带的数码相机就能实现，不需要附加的扫描仪。实现该技术需要完成以下四个步骤：（1）用手机自带的数码相机拍摄名片的图像；（2）用 OCR（optical character recognition，光学文字识别）技术自动识别（1）步摄得的名片图像中的文字；（3）用文本分类技术自动找出（2）步识别的文字中的诸如姓名、地址、邮编、电话号码、传真号码、电子邮箱地址之类的有用信息，并将它们作为识别结果显示于手机的屏幕；（4）手机用户对识别结果进行校核，经改错和确认后，手机自动将确认的识别结果添加到手机的地址簿中。该技术可快速地将名片信息输入地址簿中，省却了手工输入的麻烦和不便。上述的四个步骤中，（2）、（3）和（4）是成熟的已有技术，实施时没有任何困难。步骤（1）的任务是用手机自带的数码相机拍摄到一幅完整的、画面尽可能大和清晰的名片图像。跟用扫描仪扫描名片不一样，步骤（1）需要手机用户参与拍摄操作才能完成，而手机用户居多不掌握

摄影技术，致使最终拍摄到的名片图像经常会含有大量“噪声”，如投影变形、内容不完整、画面偏小或图像模糊等，如图 1(b)、图 1(c) 和图 2 所示，严重影响拍摄到的名片图像的质量，从而严重影响到名片扫描的识别率，造成用 OCR 技术自动识别出来的文字中混有很多错误和用文本分类技术找出的姓名等有用信息中也混有很多错误，使利用手机及其自带的数码相机能实现的名片扫描技术失去了它的实用性。

以下是一些试图解决步骤（1）存在问题的已有技术。

Lin-Chen Yu 等人提交的 United States Patent Application 20030133703 描述了一个用来固定手机和名片的装置。将手机和名片固定在该装置上，在用手机自带的数码相机拍摄名片时，可确保拍摄到的名片图像不会有投影变形和拍摄时相机不会发生抖动。该技术的缺点是要求手机用户随身携带一个利用率不高的附加装置。前已述及，不需要附加装置是手机自带的数码相机实现名片扫描的一大优点，该技术使带数码相机的手机在实现名片扫描方面失去优势。

目前多款市售的带高分辨率数码相机的手机具有名片扫描功能，其中之一就是摩托罗拉的“明”牌手机。该手机采用另一种方法拍摄名片：在手机的屏幕上的特定位置画了三条红线，提示手机用户在拍摄名片时名片的三条边应与所述的三条红线重合。当名片的三条边与所述的三条红线大致重合时，所述的红线变成绿线，同时手机的数码相机进入倒计时时期，倒计时时期结束时，手机的数码相机自动拍摄名片。该技术的缺点是用手机的数码相机拍摄名片时，数码相机与名片之间存在相对运动，手机的屏幕上的图像在不断地改变，手机用户既不容易看清名片当前所处的位置，也不知道如何移动名片，才能使名片与所述的三条红线重合。

发明内容

本发明的目的是推出一种用带数码相机的手机实现名片扫描的方法。该法在带数码相机的手机中实施，具有名片扫描功能，却没有背景技术的缺点。

为达到上述目的，本发明采用以下技术方案。在保留上述的背景技术的（2）、（3）和（4）步的基础上，对（1）步进行改进：在手机的屏幕上检测待摄名片的四条边，用第一种颜色的线画出检测到的待摄名片的四条边，使手机用户看清名片在屏幕上的位置和形状，并根据名片的当前位置用箭头提示手机用户沿箭头所指方向移动待摄名片，至名片进入适合拍摄的位置；当手机的数码相机与名片的相对位置适合拍摄时，所述的名片的四条边变为第二种颜色，提示手机用户拍摄准备就绪；手机用户只需稳稳握住手机，人工或手机自动启动数码相机的“拍摄”钮，完成待摄名片的拍摄，从而克服了拍摄时相机易发生抖动的弊病。

现结合附图详细说明本发明的技术方案，该方案包括七个步骤，其中第一、三和四步分别如图 4、5 和 6 所示。

一种用带数码相机的手机实现名片扫描的方法，包括四个步骤：

（1）用手机自带的数码相机拍摄待摄名片的图像；（2）用 OCR 技术自动识别（1）步摄得的待摄名片图像中的文字；（3）用文本分类技术自动找出（2）步识别的文字中的诸如姓名、地址、邮编、电话号码、传真号码、电子邮箱地址之类的有用信息，并将它们作为识别结果显示于所述的手机的屏幕；（4）手机用户对识别结果进行校核，经改错和确认后，手机自动将确认的识别结果添加到所述的手机的地址簿中，该方法需在带数码相机的手机内施行，在所述的手机内有含单片机系统的拍摄系统和名片识别系统，在所述的单片机系统的存储器中存储有以下程序，控制和指挥 CPU 执行以下确保该方法能正常施

行的操作：待摄名片的影像显示于所述的屏幕，角点显示于所述的屏幕，判定待摄名片的边缘，用第一种颜色画线，用第一种颜色画箭头，判定待摄名片的角的顶点与角点的重合，用第二种颜色画线，启动“拍摄”钮，其特征在于，（1）步中，所述的手机内的拍摄系统按以下步骤拍摄待摄名片的图像：

第一步，将所述的手机自带的数码相机的镜头对准待摄名片，所述的拍摄系统将待摄名片的影像显示在所述的手机的屏幕上，并在所述的屏幕上的靠近四角的地方分别显示四个角点，提示手机用户待摄名片处于适合拍摄位置时待摄名片的四个角的顶点应分别与所述的四个角点重合；

第二步，所述的拍摄系统自动检测待摄名片的四条边；

第三步，在所述的屏幕上用第一种颜色的线画出第二步检测到的待摄名片的四条边，并用第一种颜色的指示箭头指示待摄名片应该移动的方向；

第四步，所述的拍摄系统检查待摄名片是否位于适合拍摄位置，如不，返回并执行第二步，如是，在所述的屏幕上用第二种颜色的线画出待摄名片的四条边，提示手机用户待摄名片位于适合拍摄的位置，可以拍摄，进入并执行第五步；

第五步，手机用户判别手机的拍摄设置，如为“人工拍摄”，进入并执行第六步，如为“自动拍摄”，进入并执行第七步；

第六步，手机用户稳稳握住手机，按所述的手机的“拍摄”钮，得到待摄名片的影像；

第七步，所述的拍摄系统自动启动所述的手机的“拍摄”钮，得到待摄名片的影像。

本发明的技术方案的进一步特征在于，第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色。

本发明的技术方案的进一步特征在于，在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕。

本发明的方法特别适于在带数码相机的手机中，也可在带摄像头的移动设备中，用来拍摄待摄名片的影像。

与背景技术相比，本发明具有以下优点：

1、通过屏幕提示，引导手机用户拍摄到高质量的待摄名片的图像。

通过在所述的屏幕上检测到的待摄名片的四条边可以让手机用户清楚地看到待摄名片的当前位置和形状，提示箭头可以让手机用户清楚地知道应如何移动待摄名片才能拍摄到合格的图像。通过屏幕提示，引导任何一个不谙摄影技术的手机用户拍摄到高质量的待摄名片的图像。

2、自动拍摄功能使手机的相机在不抖动的情況下拍摄待摄名片的图像，有助于提高摄得的待摄名片的图像的质量。

以上两个优点确保所述的手机能摄得不含任何“噪声”的、高质量的待摄名片的图像，从而保证所述的名片识别系统的识别准确率和提高所述的名片识别系统的可用性和易用性。

附图说明

图 1(a)和图 1(b)分别是投影形变小和投影形变大的示意图。

图 2 示出了相机抖动造成待摄名片的图像模糊的示意图。

图 3 是本发明的方法的操作流程图。

图 4 是所述的手机的屏幕的屏幕显示之一，其中，四个红色直角分别是四个角点。

图 5 是所述的手机的屏幕的屏幕显示之二，其中，四条红线是

待摄名片的四条边，红色提示箭头提示待摄名片需要移动的方向。

图 6 是所述的手机的屏幕的屏幕显示之三，其中，四条绿线是待摄名片的四条边，四个绿色直角是四个角点，四条边和四个角点由红色转变为绿色，表示待摄名片位于适合拍摄的位置。

具体实施方式

实施例 1

本实施例完全按 “发明内容” 所述的的方法在具有以下技术指标的带数码相机的手机内施行：

手机的牌号：dopod(多普达)830 型；

数码相机的分辨率：2Mpix.；

CPU 工作频率：195MHz；

单片机系统内的存储器容量：44Mbit；

屏幕对角线长度：2.8in.；

屏幕分辨率：320*240 pix.；

手机操作系统：微软的 windows mobile 5.0。

实施例 2

本实施例除以下不同外，其余的部分与实施例 1 完全相同：第三步中，第一种颜色是红色，第四步中，第二种颜色是绿色。

实施例 3

本实施例除以下不同外，其余的部分与实施例 2 完全相同：在执行每一个步骤时，所述的拍摄系统把指导手机用户正确操作的指示语句显示于所述的屏幕。

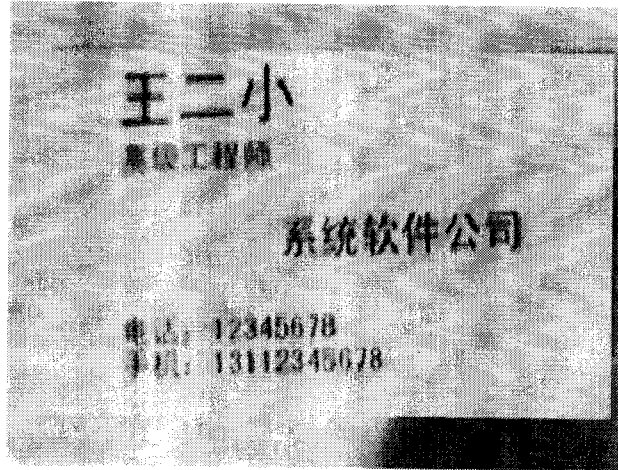


图 1 (a)

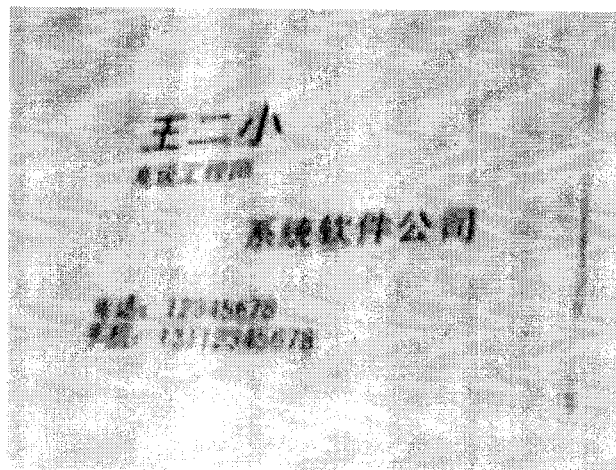


图 1 (b)

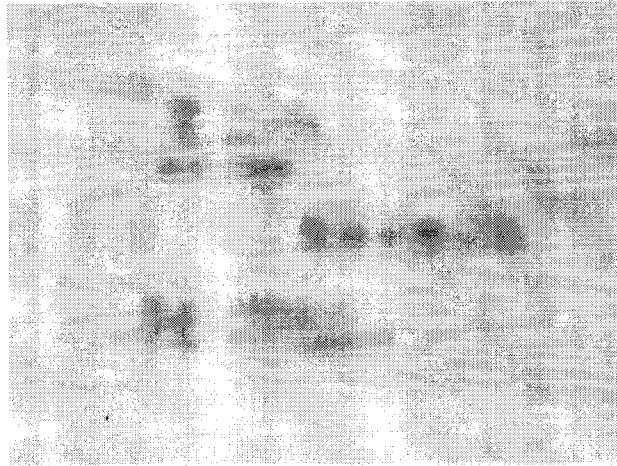


图 2

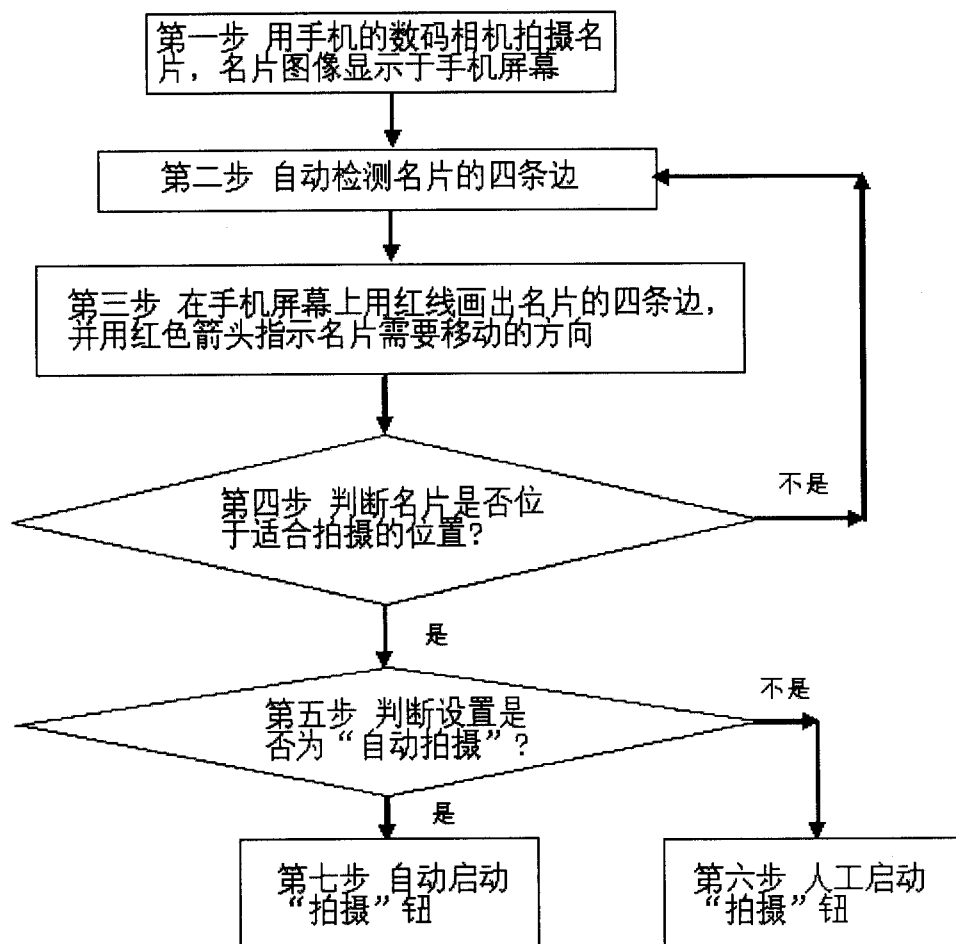


图 3

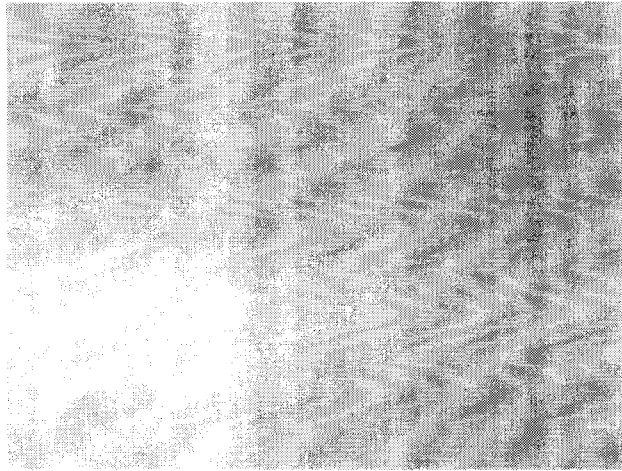


图 4



图 5

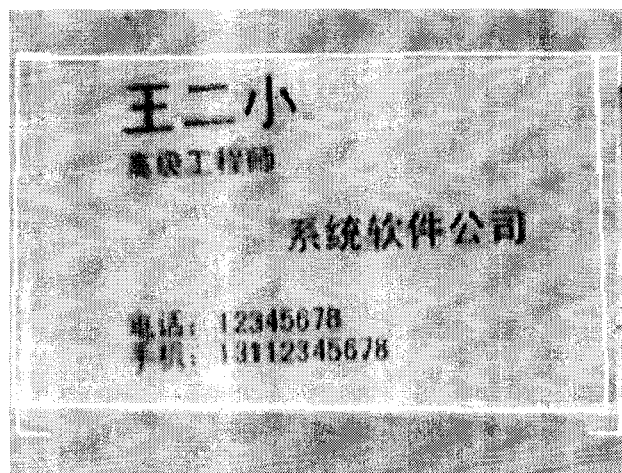


图 6

EXHIBIT B

[19] State Intellectual Property Office of the People's Republic of China

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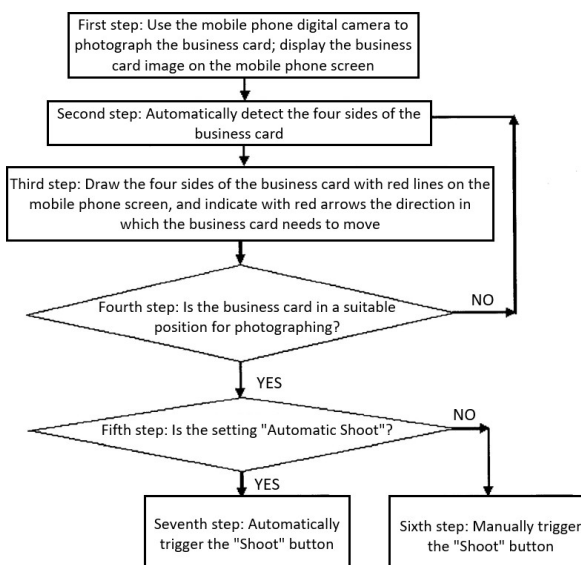
Claims 3 pages; Description 6 pages; Drawings 3 pages

[54] Title of the invention

A method of scanning business cards using a
mobile phone with a digital camera

[57] Abstract

A method of scanning business cards using a mobile phone with a digital camera; the method, which pertains to the technical field of mobile phone apps, uses said mobile phone to add useful information included on a business card, such as name and address, directly to the address book of a mobile phone and includes steps for photographing the business card using the mobile phone: detecting the four sides of the targeted business card on the mobile phone screen, using lines of one color to draw the detected four sides of the targeted business card so that the mobile phone user can clearly see the position and shape of the business card on the screen, and using arrows based on the current position of the business card to prompt the mobile phone user to move the business card in the direction pointed to by the arrows until the business card arrives at a position suitable for photographing; when the business card is in a position suitable for photographing, the four sides of said business card become a second color, indicating to the mobile phone user it is ready to take a photograph; to photograph the targeted business card, the mobile phone user needs only to hold the mobile phone steady and trigger the "shoot" button to finish photography of the business card, either manually or automatically by the mobile phone, thus overcoming a drawback, namely the camera shaking during photographing.



1. A method of scanning business cards using a mobile phone with a digital camera, comprising four steps: (1) using the built-in digital camera of the mobile phone to photograph the targeted business card; (2) using OCR technology to automatically recognize text in the photograph taken of the targeted business card in step (1); (3) using text classification technology to automatically locate useful information, such as name, address, postal code, telephone number, fax number, and email address, within the text recognized in step (2) and displaying such as recognition results on said mobile phone screen; and (4) the mobile phone automatically adding the confirmed recognition results to the address book of said mobile phone after the mobile phone user has checked, corrected, and confirmed the recognition results; the method needs to be implemented on a mobile phone that has a digital camera, said mobile phone having both a camera system containing a single-chip microcomputer system and a business card recognition system, wherein the memory of said single-chip microcomputer system stores programs that are for controlling and commanding the CPU to execute the following operations to ensure that the method can be implemented normally: displaying the image of the targeted business card on said screen, displaying corner points on said screen, assessing the edges of the targeted business card, drawing lines in a first color, drawing arrows in the first color, determining whether the corner points coincide with the corner vertices of the targeted business card, drawing the lines in a second color, and triggering the “shoot” button; it is characterized in that, in step (1), the camera system in said mobile phone photographs the targeted business card according to the operating steps below:

First step: aim the lens of the built-in digital camera of said mobile phone at the targeted business card, said camera system displays an image of the targeted business card on the screen of said mobile phone and separately displays four corner points in places near the four corners of said screen, which indicates to the mobile phone user that the vertices of the four corners of the targeted business card should coincide, respectively, with said four corner points when the targeted business card is in a position suitable for photographing;

Second step: said camera system automatically detects the four sides of the targeted business card;

Third step: use lines of the first color to draw the four sides of the targeted business card detected in the second step on said screen, and use prompt arrows in the first color to indicate the direction in which the targeted business card should be moved;

Fourth step: said camera system checks whether the targeted business card is in a suitable position for photographing; if not, it returns to and executes the second step; if so, it uses lines in the second color to draw the four sides of the targeted business card on said screen to indicate to the mobile phone user that the targeted business card is in a suitable position for photographing and that it is ready to take the photograph and it proceeds to and executing the fifth step;

Fifth step: the mobile phone user determines the photography setting of the mobile phone; if it is “manual shoot,” it proceeds to and executes the sixth step; if it is “automatic shoot,” it proceeds to and executes the seventh step;

Sixth step: the mobile phone user holds the mobile phone steady and presses the “shoot” button of said mobile phone to obtain

an image of the targeted business card;

Seventh step: said camera system automatically triggers the “shoot” button of said mobile phone to obtain an image of the targeted business card.

2. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that the first color on the third step is red and the second color on the fourth step is green.

3. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step.

4. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that the method is implemented on a mobile phone with a digital camera with the following technical specifications:

Mobile phone brand: Dopod 830;

Digital camera resolution: 2 Mpix;

CPU operating frequency: 195 MHz;

Memory capacity in single-chip microcomputer system: 44 Mbit;

Screen diagonal: 2.8 in;

Screen resolution: 320 x 240 pix;

Mobile phone operating system: Microsoft Windows Mobile 5.0.

5. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that the first color in the third step is red and the second color in the fourth step is green; and that said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step.

6. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that the first color in the third step is red and the second color in the fourth step is green; and that the method is implemented on a mobile phone with a digital camera with the following technical specifications:

Mobile phone brand: Dopod 830;

Digital camera resolution: 2 Mpix;

CPU operating frequency: 195 MHz;

Memory capacity in single-chip microcomputer system: 44 Mbit;

Screen diagonal: 2.8 in;

Screen resolution: 320 x 240 pix;

Mobile phone operating system: Microsoft Windows Mobile 5.0.

7. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step; and that the method is implemented on a mobile phone with a digital camera with the following technical specifications:

Mobile phone brand: Dopod 830;

Digital camera resolution: 2 Mpix;

CPU operating frequency: 195 MHz;

Memory capacity in single-chip microcomputer system: 44 Mbit;

Screen diagonal: 2.8 in;

Screen resolution: 320 x 240 pix;

Mobile phone operating system: Microsoft Windows Mobile 5.0.

8. The method of scanning business cards using a mobile phone with a digital camera as described in claim 1, is characterized in that the first color in the third step is red and the second color in the fourth step is green; that said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step; and that the method is implemented on a mobile phone with a digital camera with the following technical specifications:

Mobile phone brand: Dopod 830;

Digital camera resolution: 2 Mpix;

CPU operating frequency: 195 MHz;

Memory capacity in single-chip microcomputer system: 44 Mbit;

Screen diagonal: 2.8 in;

Screen resolution: 320 x 240 pix;

Mobile phone operating system: Microsoft Windows Mobile 5.0.

A Method of Scanning Business Cards Using a Mobile Phone with a Digital Camera

Field of the Invention

The present invention relates to a method of scanning business cards using a mobile phone with a digital camera, and the field of the invention is mobile phone apps.

Background of the Invention

Digital cameras that are built into mobile phones are becoming increasingly widespread, and the resolutions of the digital cameras are also increasing. This trend has created the necessary conditions for business card scanning apps on mobile phones with digital cameras.

Business card scanning technology is the technology whereby a mobile phone with a digital camera adds useful information included on a business card, such as name, address, postal code, telephone number, fax number, and email address, directly to the address book of the mobile phone. The greatest advantage that this technology has over the traditional method of scanning business cards with a scanner is that the above-described task of adding useful information can be carried out using just the mobile phone and its built-in digital camera without an additional scanner. To implement this technology, it is necessary to complete the following four steps: (1) use the built-in digital camera of the mobile phone to photograph the business card; (2) use OCR (optical character recognition) technology to automatically recognize text in the photograph taken in step (1) of the business card; (3) use text classification technology to automatically locate useful information, such as name, address, postal code, telephone number, fax number, and email address, within the text recognized in step (2) and display such as recognition results on the mobile phone screen; (4) after the mobile phone user checks, corrects, and confirms the recognition results, the mobile phone automatically adds the confirmed recognition results to the address book of the mobile phone. This technology can quickly input business card information into an address book without the trouble and inconvenience of manual input. Of the four steps described above, (2), (3), and (4) are mature prior art whose implementation does not involve any difficulty. The task of step (1) is to take a business card photograph that is complete and that is as large and clear as possible. Unlike scanning a business card with a scanner, step (1) can be completed only if the mobile phone user participates in the photograph-taking operation; however, most mobile phone users have not mastered

photography techniques, which leads to the result that the photographs of business cards ultimately taken often contain a large amount of “noise,” such as projection distortion, incomplete content, excessively small pictures, or fuzzy images; as shown in FIGS. 1(b), 1(c), and 2; the impact of such on the quality of business card photographs is severe, which in turn severely affects the recognition rate of the business card scan, leading to many errors in the text automatically recognized by OCR technology and many errors in the names and other useful information located by text classification technology, thus depriving the business card scanning technology that can be implemented by a mobile phone and its built-in digital camera of its practical value.

The following is prior art that attempts to solve the problem of step (1).

United States Patent Application 20030133703 submitted by Lin-Chen Yu et al. describes a device for fixing a mobile phone and a business card. The mobile phone and the business card are fixed on the device; when a photograph of the business card is taken with the built-in digital camera of the mobile phone, it can ensure there will be no projection distortion in the business card photograph and that the camera will not shake during shooting. The drawback of this technology is that it requires the mobile phone user to carry around an additional device that is not often used. As mentioned above, a major advantage of scanning business cards using the built-in digital camera of a mobile phone is that there is no need for an additional device; this technology makes mobile phones with digital cameras lose their advantage in business card scanning.

Many models of mobile phones with high-resolution digital cameras currently on the market have a business card scanning feature, e.g., Motorola’s “Ming” phone. This mobile phone uses another method to photograph business cards: three red lines are drawn at specific locations on the mobile phone screen to remind the mobile phone user when photographing a business card that three sides of the business card should coincide with the three red lines. When the three sides of the business card roughly coincide with said three red lines, said red lines become green lines, and the digital camera of the mobile phone simultaneously enters a countdown phase; when the countdown phase ends, the mobile phone’s digital camera automatically photographs the business card. The drawback to this technology is that, when a business card is photographed using a mobile phone’s digital camera, there is relative motion between the business card and the digital camera, and the image on the mobile phone screen continuously changes; the mobile phone user not only finds it difficult to have a clear view of the current location of the business card, but also does not know how to move the business card so as to make the business card coincide with said three red lines.

Summary of the Invention

The objective of the present invention is to introduce a method of scanning business cards using a mobile phone with a digital camera. The method is implemented on a mobile phone with a digital camera and involves a business card scanning feature, but does not have the drawbacks of prior art.

To achieve the objective described above, the present invention employs the technical solution below. While retaining steps (2), (3), and (4) of the prior art above, it improves step (1) by: detecting the four sides of the targeted business card on the mobile phone screen, drawing the detected four sides of the targeted business card in the first color so that the mobile phone user can clearly see the position and shape of the business card on the screen, and using arrows based on the current position of the business card to prompt the mobile phone user to move the targeted business card in the direction indicated by the arrows until the business card arrives at a position suitable for photographing; when the relative position between the digital camera of the mobile phone and the business card is suitable for shooting, the four edges of the business card change to the second color, prompting the mobile phone user to be ready for shooting; to photograph the targeted business card, the mobile phone user needs only to hold the mobile phone steady and trigger the “shoot” button of the digital camera, either manually or automatically by the mobile phone, thus overcoming a drawback, namely the camera shaking during photographing.

The technical solution of the present invention will now be described in detail, with reference to the drawings; this solution comprises seven steps, wherein the first, third, and fourth steps are depicted in FIGS. 4, 5, and 6, respectively.

A method of scanning business cards using a mobile phone with a digital camera, comprising four steps: (1) using the built-in digital camera of the mobile phone to photograph the targeted business card; (2) using OCR technology to automatically recognize text in the photograph taken of the targeted business card in step (1); (3) using text classification technology to automatically locate useful information, such as name, address, postal code, telephone number, fax number, and email address, within the text recognized in step (2) and displaying such as recognition results on said mobile phone screen; (4) the mobile phone automatically adds the confirmed recognition results to its address book after the mobile phone user has checked, corrected, and confirmed the recognition results; the method needs to be implemented on a mobile phone that has a digital camera, said mobile phone has both a camera system containing a single-chip microcomputer system and a business card recognition system, wherein the memory of said single-chip microcomputer system stores programs for controlling and commanding the CPU to execute the following operations to ensure that the method is implemented normally:

display the image of the targeted business card on said screen, display corner points on said screen, assess the edges of the targeted business card, draw lines in the first color, draw arrows in the first color, determine whether the corner points coincide with the corner vertices of the targeted business card, draw the lines in the second color, and trigger the “shoot” button; it is characterized in that, in step (1), the camera system in said mobile phone photographs the targeted business card according to the operating steps below:

First step: aim the lens of the built-in digital camera of said mobile phone at the targeted business card, said camera system displays an image of the targeted business card on the screen of said mobile phone and separately displays four corner points in places near the four corners of said screen, which indicates to the mobile phone user that the vertices of the four corners of the targeted business card should coincide, respectively, with said four corner points when the targeted business card is in a position suitable for photographing;

Second step: said camera system automatically detects the four sides of the targeted business card;

Third step: use lines of the first color to draw the four sides of the targeted business card detected in the second step on said screen, and use indicative arrows in the first color to indicate the direction in which the targeted business card should be moved;

Fourth step: said camera system checks whether the targeted business card is in a suitable position for photographing; if not, it returns to and executes the second step; if so, it uses lines in the second color to draw the four sides of the targeted business card on said screen to indicate to the mobile phone user that the targeted business card is in a suitable position for photographing and that it is ready to take the photograph and it proceeds to and executing the fifth step;

Fifth step: the mobile phone user determines the photography setting of the mobile phone; if it is “manual shoot,” it proceeds to and executes the sixth step; if it is “automatic shoot,” it proceeds to and executes the seventh step;

Sixth step: the mobile phone user holds the mobile phone steady and presses the “shoot” button of said mobile phone to obtain an image of the targeted business card;

Seventh step: said camera system automatically triggers the “shoot” button of said mobile phone to obtain an image of the targeted business card.

The technical solution of the present invention is further characterized in that the first color in the third step is red and the second color in the fourth step is green.

The technical solution of the present invention is further characterized in that said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step.

The method of the present invention is especially suited for taking photographs of targeted business cards on a mobile phone with a digital camera or on a mobile device with a camera.

The present invention has the following advantages over the prior art:

1. It uses screen prompts to guide mobile phone users to take high-quality photographs of targeted business cards.

The four sides of the targeted business card detected on said screen enable the mobile phone user to clearly view the current position and shape of the targeted business card, and the prompt arrows allow the mobile phone user to clearly know how to move the targeted business card to take an acceptable photograph. Screen prompts guide any mobile phone user who is not adept at taking photographs to take high-quality photographs of targeted business cards.

2. As a result of the automatic shooting feature, the mobile phone camera photographs targeted business cards without shaking, thereby helping to improve the quality of photographs taken of targeted business cards.

The above two advantages ensure that said mobile phone can take targeted business card photographs that are high-quality and do not contain any “noise,” thus ensuring the recognition accuracy of said business card recognition system and improving the usefulness and convenience of said business card recognition system.

Description of the Drawings

FIGS. 1(a) and 1(b) are illustrations of projection shrinkage and projection magnification.

FIG. 2 is an illustration of a fuzzy image of a targeted business card resulting from a shaking camera.

FIG. 3 is a flowchart of operations in the method of the present invention.

FIG. 4 is the first screen display of the screen of said mobile phone, wherein the four red right angles are four corner points.

FIG. 5 is the second screen display of the screen of said mobile phone, wherein four red lines are

the four sides of a targeted business card, and the red prompt arrows indicate the direction in which the targeted business card needs to move.

FIG. 6 is the third screen display of the screen of said mobile phone, wherein four green lines are the four sides of the targeted business card, four green right angles are the four corner points, and the fact that the four sides and four corner points have turned from red to green indicates that the targeted business card is in a suitable position for photographing.

Specific Embodiments

First embodiment

The present embodiment is implemented in complete accordance with the method described in “Summary of the Invention” on a mobile phone having the technical specifications below:

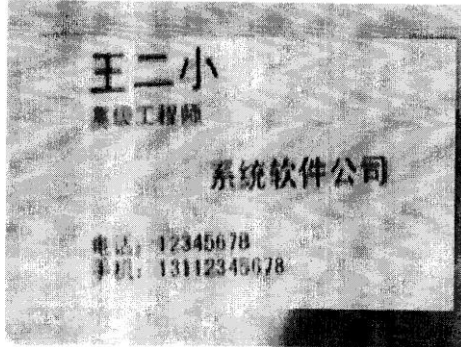
Mobile phone brand: Dopod 830;
Digital camera resolution: 2 Mpix;
CPU operating frequency: 195 MHz;
Memory capacity in single-chip microcomputer system: 44 Mbit;
Screen diagonal: 2.8 in;
Screen resolution: 320 x 240 pix;
Mobile phone operating system: Microsoft Windows Mobile 5.0.

Second embodiment

The present embodiment is entirely the same as the first embodiment except for the following: the first color on the third step is red and the second color on the fourth step is green.

Third embodiment

The present embodiment is entirely the same as the second embodiment except for the following: said camera system displays instructional text on said screen to guide the mobile phone user to perform correct operations during the execution of each step.

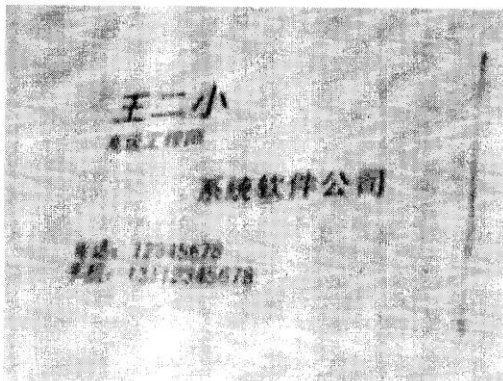


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FIG. 1(a)



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FIG. 1(b)



FIG. 2

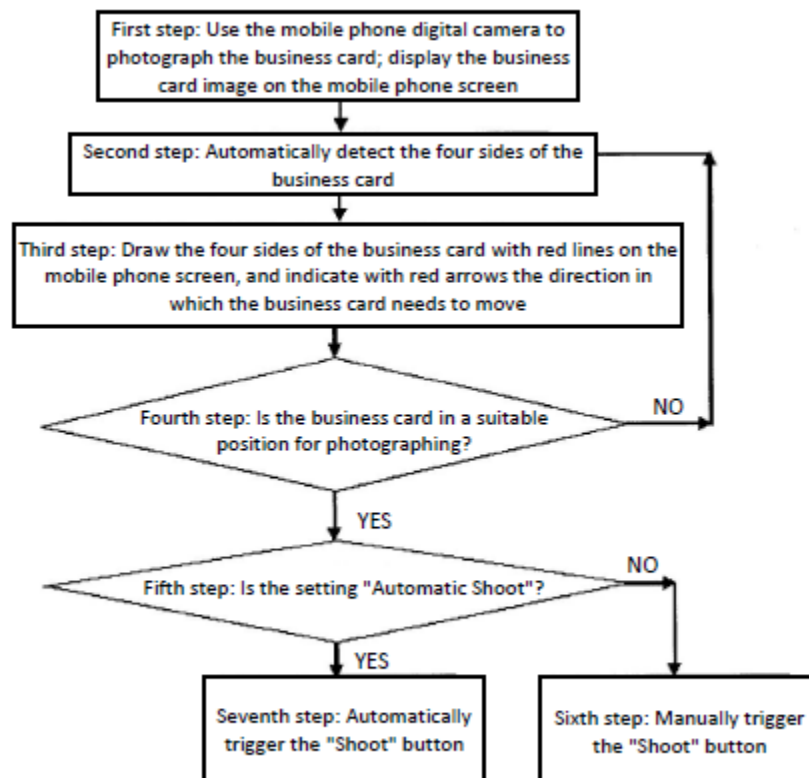


FIG. 3

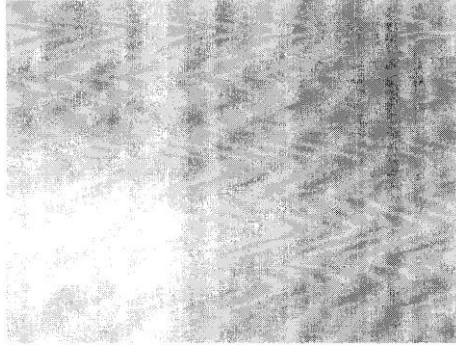


FIG. 4

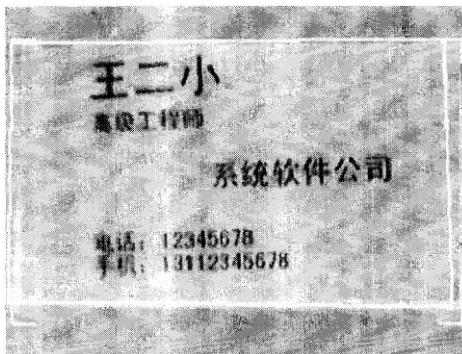


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FIG. 5



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FIG. 6