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Barcode Scanning System

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Abstract – Digital Image Processing is the use of a digital computer to process digital images through an algorithm. It enables a considerably broader choice of algorithms to be applied to the input data, as well as avoiding issues like noise and distortion during processing. A sector where Digital Image Processing is used is Barcode Scanning System. An optical scanner that can read printed barcodes, decode the data contained in the barcode, and communicate the data to a computer is known as a barcode scanner.

I. INTRODUCTION

Images play an important role in the life of humans. An image is a two-dimensional object that resembles an object, generally a physical thing, and hence gives a representation of it, such as a photograph or other two-dimensional picture. [1] In today's age, images are present all around us. As there are images present all around us, processing these images is required.

This processing of images as per our needs is called Image Processing. Image processing is a technique for performing operations on an image to improve it or extract relevant information from it. It's a form of signal processing in which an image is the input and the output is an image or the image's characteristics/features. [2]

Today, as images are present all around us, image processing is among rapidly growing technologies. It's forming its core research area within engineering and computer science disciplines. [2]

Based on the data types, the two methods of image processing available today are Analog Image Processing and Digital Image Processing.

Analog Image Processing refers to any image processing action performed on two-dimensional analog signals utilizing analog methodologies. The practice of utilizing a digital computer to process digital photographs using an algorithm is known as digital image processing. Digital image processing, as a subsection or discipline of Digital Signal Processing, provides several benefits over Analog Image Processing.[3]

Digital Image Processing allows for a far wider choice of algorithms to be applied to the input data, as well as the avoidance of issues like noise and distortion during processing. Digital image processing may be represented as multidimensional systems since pictures are described in two dimensions, which is one of the key benefits of digital image processing over analog image processing. [4]

A sector where Digital Image Processing is used is Barcode Scanning System. An optical scanner that can read printed barcodes, decode the data contained in the barcode, and communicate the data to a computer is known as a barcode scanner. [5]

Barcodes are present all around today. They look very insufficient but are very important in today's life. Today, the entire supply chain of the World could be tracked with help of barcodes. Today, each & every package to be shipped could be tracked in real-time with the help of barcodes.

II. LITERATURE SURVEY

For billions of items sold every day, the linear 1D barcode is the primary tagging technique. Barcodes offer a lot of benefits, but they require a laser scanner to scan them quickly and reliably. There are mobile phone apps that can scan barcodes, but they require a nicely framed picture inside the field of vision. This undercuts barcodes' actual potential in a variety of circumstances. This paper describes a real-time approach for detecting barcodes in video streams in this work. In terms of accuracy and speed, our method beats state-of-the-art passive techniques. This article also discusses potential commercial uses offered by such passive scanning systems. [6]

Barcodes are also used in the industrial sector to identify products during the production process. However, barcode systems in industrial factories necessitate the use of a specific barcode reader, which is more sophisticated and expensive than a standard barcode reader. Recently, any smartphone can be used to scan barcodes, but no research has been done on how to use a smartphone barcode reader in an industrial

setting. As a result, this paper looks at ways to employ a smartphone as a barcode scanner in an industrial setting. By collaborating with the barcode reader library and simulating the barcode reader system in the production process, an Android smartphone was utilized to build a barcode reader application. 1D barcodes and QR codes were used in the experiment of this paper. [7]

People are seeking creative ways to use barcodes in the wireless world because they have been used for decades as a very successful technique in many traditional commerce systems. Because 2D barcodes not only provide a simple and cost-effective way of presenting varied commerce data, but they also improve the mobile user experience by reducing inputs, the mobile industry has lately begun to pay increased attention to barcode applications in m-commerce. This paper initially goes through 2D-barcode ideas, kinds, and classifications, as well as significant technological providers and mobile commerce applications. The paper then goes on to describe a research effort that aims to build a 2D barcode processing solution for mobile apps. The article also includes application examples and a case study that uses the solution. [8]









1D barcodes	Code 39  123456	Code 128  123456	EAN-13  1 234567 890128	ISBN  9 781234 567897
2D barcodes	QR Code 	PDF417 	DataMatrix 	Maxi Code 

Figure 1 – Types of Barcodes

III. PROPOSED BARCODE SCANNING SYSTEM ALGORITHM

The proposed Barcode Scanning System program could have been written in C++, Java, or MATLAB, but instead was written in Python. The reason for writing this program in Python is that the necessary commands for Barcode Scanning are accessible in Python, and the Python programming language is simple. Python has a strong & powerful tool that has different toolboxes which are of great help in Digital Image Processing.

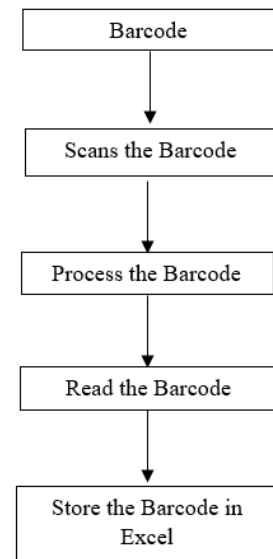


Figure 2 – Proposing Flowchart of the Program

In the proposed program, the program will scan the barcode using the camera of the device. The barcode will go through the program & the program will read the barcode & store the code in Microsoft Excel for storage purposes.

IV. EXPERIMENTAL RESULTS

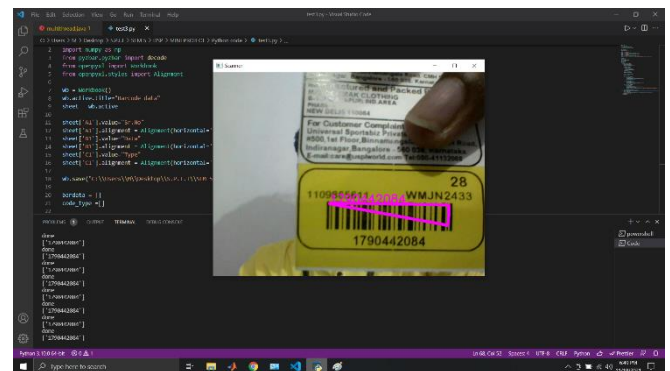


Figure 3 – Proposed Code reading Code128 1D Barcode

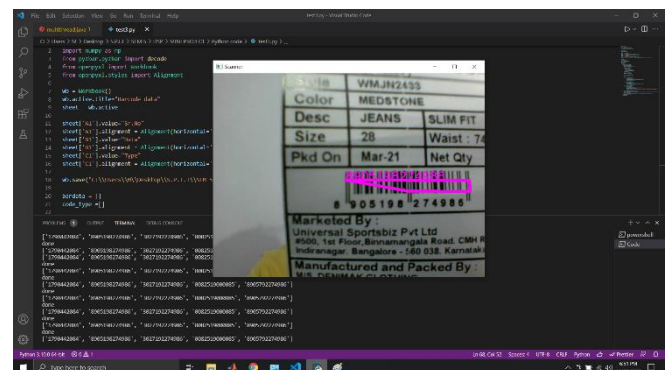


Figure 4 – Proposed Code reading EAN13 1D Barcode

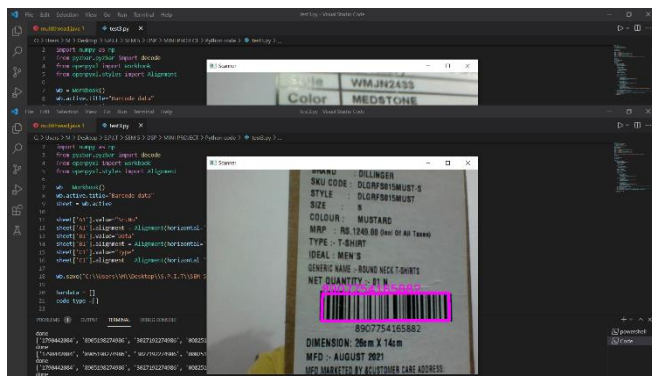


Figure 5 – Proposed Code reading Code128 1D Barcode

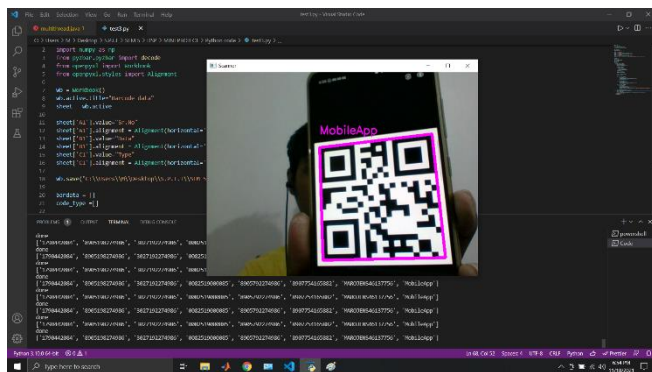


Figure 6 – Proposed Code reading QR 2D Barcode

Sr.No	Data	Type
1	1790442084	CODE128
2	8905198274986	EAN13
3	3027192274986	EAN13
4	0082519000085	EAN13
5	8905792274986	EAN13
6	8907754165882	CODE128
7	MARJENS46137756	CODE128
8	MobileApp	QR CODE

Figure 7 – Barcode Data stored in Microsoft Excel

When the user places the barcode near the camera, the code generates a pink box around the barcode. This pink box signifies the presents of the barcode. The code will then read the barcode & show its data in the Terminal of the Visual Studio. This data is then stored in the Microsoft Excel File which is mentioned in the code. In the Excel Sheet, the data & the type of the barcode are mentioned.

V. APPLICATIONS

Applications of Barcode Scanning are endless. It is being used in attendance management systems. It is used in stocking & inventory of products. It is used in the tracking of products & many more. Barcodes in the form of QR codes are used as a mode of payment. Barcodes can also be used as a mode of sharing

information like email addresses & phone numbers between two people.

VI. CONCLUSION

Experimental results indicate that the proposed method has significantly efficient in reading the barcode & storing the same in the designated Microsoft Excel Sheet. The main disadvantage of the proposed method is that the proposed code can read all types of 1D Barcode but can only read QR Code in the 2D Barcode Family. In our future works, the aim will be to scan the remaining types of 2D Barcodes using the code & synchronize the Barcode Data with the Barcode Data Database, so that we can identify the product.

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