The Nifty Barcoder

Brought to you by Opait Software

Barcodes play a central role in today's business processes and automation. They come in a variety of specialized formats and can encode information in linear, as well as, two-dimensional grid formats. In recent years, some barcode formats, in particular the QR-Code, have broken from their industrial frame and entered our everyday life. Barcodes have the unique ability to connect physical objects with online digital content.

A simple QR-Code (Quick Response Code) is a square barcode that can store up to 4,296 characters of information about people, products or social events. A business card with a QR-Code can be scanned by any smart phone and transfer a great deal of information about the holder, including name, address, company, phone numbers, email addresses, or even tag lines and hobbies.

Barcodes are used in a variety of process:

- Inventory Control
- Point of Sale
- Secured Access
- Quality Control
- Decision Making
- Work in Progress
- Time and Attendance
- Data Extraction (forms)
- Productivity Measurement
- Projects, Processes, Workflow

But more importantly:

- Party Invitations
- Personal Identities
- Theater Tickets
- Games
- Social Media

Barcodes are everywhere and they are not going away anytime soon! Or, at least up until we all receive electronic implants capable of synching up our entire histories in a fraction of a second.

The software market for barcodes is saturated with vendors competing for a piece of the action. They often charge inflated prices based on à la carte individual formats, volumes, maintenance, number of end users and developers. The 'old timers' have ruled this market, up until now.

The nifty Barcoder aims to do away with all that baggage and offer everything related to barcodes in one agile software product. Imagine a package that can render all popular 1D & 2D barcodes, can find and decode any number of them, and let users generate and add them to all their digital assets at will.

My Driving License

If you look at the back of your driving license, you will see a couple of barcodes. Ever wondered what kind of stuff these barcodes hide? I took a picture of my driving license and used our nifty demo program to peek into the two barcodes. Here is what I found:

My driver license with a couple of redacted personal info

The nifty Barcoder comes with this desktop application for encoding and decoding barcodes, a capable command line interface, and a set of .NET as well as REST API for online usage. To extract this info from the picture, the command line would be as simple as providing the name of the image file:

```
Barcoder d:\barcodes\drivinglicense.jpg
```

To create your own barcode, you could also simply type you message followed by the file that you wish to save the generated image as:

```
Barcoder "My secret message to my favorite person." D:\MySecret.png
```

You could go on from there to explore many powerful options that the library offers.

What about my PDF Files?

We all have a lot of PDF files that would benefit from the addition of such compact extra information. Maybe we want to classify our PDF files or add some historical facts about them. Maybe we need to embed instructions, control their lifetimes or add indexes for search and retrieval. The possibilities are endless.

This is the area that the nifty barcoder shines. It will take your existing documents, add any number of barcodes to them and save as new PDF files. It will even handle those mysteriously encrypted PDF files, just fine. The new PDF files will retain their original security settings.

But wait, PDFs are, or can be, so much superior to those old images and TIFF files. When you zoom into a PDF, you expect not to see the artful pixelization that so many of us have grown to love with images. The nifty barcoder has no problems here. It will render all PDF destined barcodes in PDF's own language and not as embedded images. The barcodes will never show any jagged edges. And, compared to images, these barcodes will be much smaller. In fact, a PDF document that includes every supported barcode format would be about 10K in file size, potentially smaller than the size of a single image-based barcode.

To illustrate, we used MaxiCode, which is a barcode format used by UPS, with circles and hexagons. The Barcoder can create one easily with the command line or the GUI.
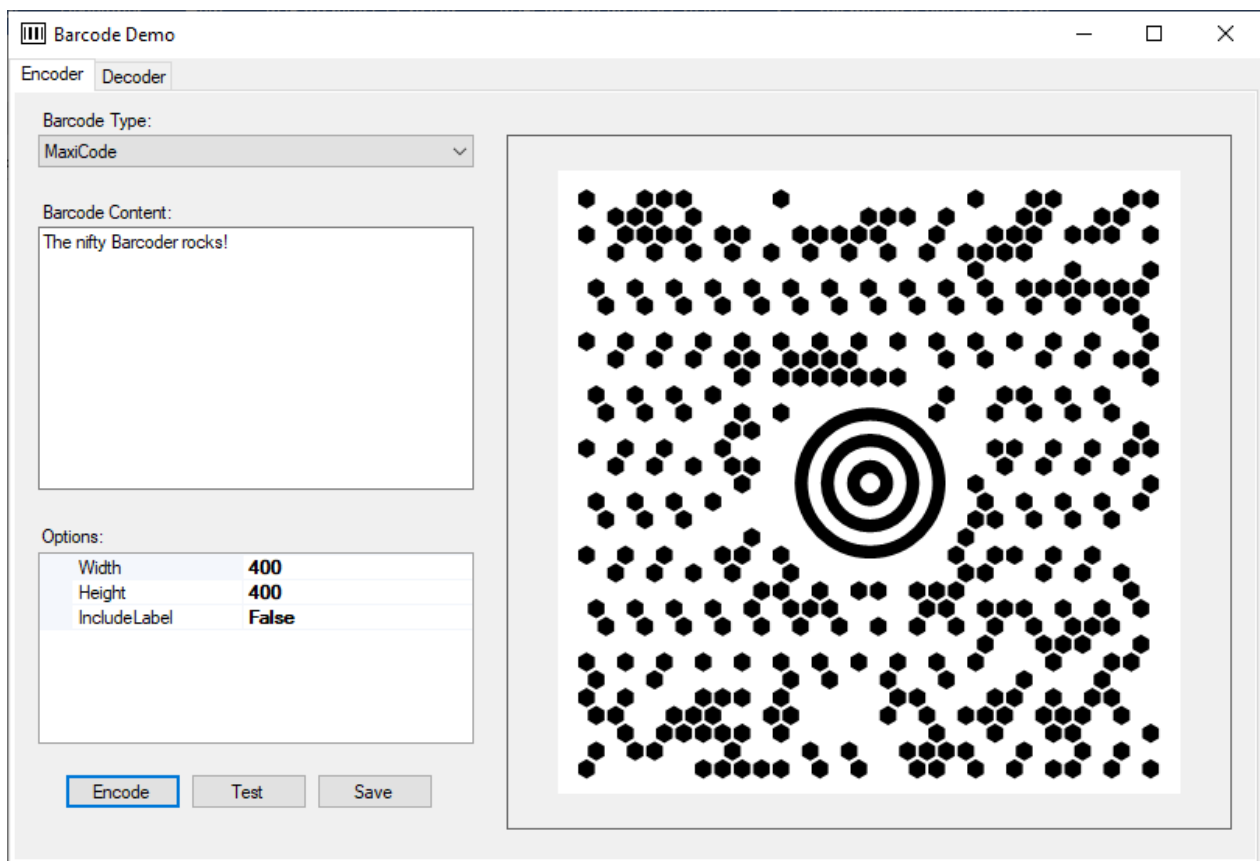

In the image of the barcode you can see the pixels and jagged lines, if you look close enough.

Now suppose that we have an existing PDF file to which we want to add this barcode. Using a simple command, a MaxiCode barcode is generated in PDF language and placed on the bottom left hand corner of the PDF file. We could, of course, place the barcode on every page, every other page or a range of pages with additional options. Everything is configurable, but the defaults work most of the time.

```
D:\>barcoder "The nifty Barcoder rocks!" d:\Nifty.pdf d:\NiftyPlus.pdf -format MaxiCode -v

Barcoder Library - Version 1.0.0.0
Copyright © 2019 Opait Software.
Processing d:\Nifty.pdf – 1 page.
Adding barcode to page 1.
Page visible area: Left=0 Bottom=0 Width=612 Height=792
Saved to file: d:\NiftyPlus.pdf
```
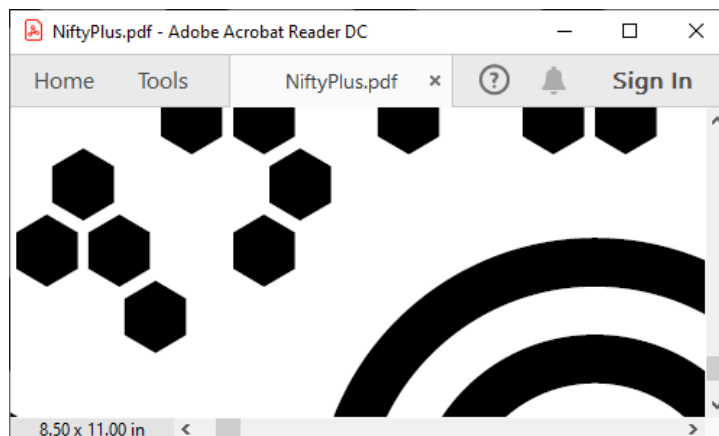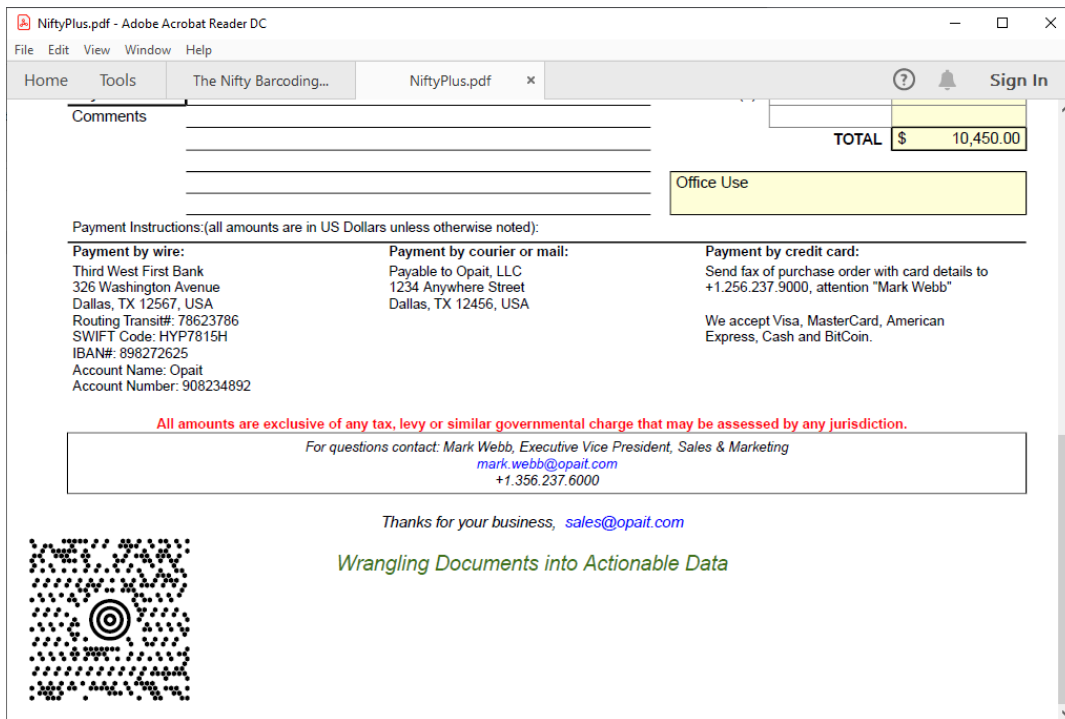

Zoomed Barcode

Supported Barcode Formats (Read and Write)

The Barcoder was developed by Opait software (https://opait.com). Some of the rendering and detection modules were adopted from open source projects.

The PDF capability comes from the, also nifty, Opait PDF library.

Aztec Code is a two-dimensional (2-D) general-purpose matrix symbology that is designed to have higher accuracy than other 2-D symbologies. An Aztec Code symbol can encode up to 3,832 numeric digits; 3,067 alphabetic characters; or 1,914 bytes of data.
Bookland encodes the ISBN number in EAN-13 format followed by a 5-digit supplemental code. The barcode data always consists of the digits '978' (the EAN article identifier), followed by a 9-digit number and one check digit. The 5-digit add-on barcode is used to encode the book price.
Codabar is a discrete, self-checking symbology that may encode 16 different characters, plus an additional 4 start/stop characters. This symbology is used by U.S. blood banks, photo labs, and on FedEx air bills.
Code11 is mainly used in telecommunications for marking equipment and components.
Code39, also known as "3 of 9 code" or "USD-3", it is the standard barcode used by the United States Department of Defense, and by the Health Industry Bar Code Council (HIBCC). Code 39 is a discrete, variable-length symbology. The character set can be extended to cover the full ASCII range [0..127] and an optional checksum character can be appended to the encoded string.
Code93 was invented to achieve better information density as compared to code 39. Can also concatenate multiple barcodes using a space as the first character. The extended version covers all ASCII characters.
Code128 is a modern high-density symbology heavily used in all areas. Code 128: ASCII-characters between 0..127 Subset A: Upper Case + Non-Printable Characters (ASCII 0-31) Subset B: Upper / Lower Case + All Printable Characters Subset C: Numeric with doubled density
DataMatrix is a 2D barcode consisting of black and white "cells" or modules arranged in either a square or rectangular pattern. The information to be encoded can be text or numeric data. Usual data size is from a few bytes up to 1556 bytes. Error correction codes are often used to increase reliability. A Data Matrix symbol can store up to 2,335 alphanumeric characters.
EAN2 is a 2-digit add-on for EAN 13 and UPC-A. The EAN2 add-on is often used on newspapers and magazines.
EAN5 is a 5-digit add-on for EAN 13 and UPC-A. The EAN5 add-on is often used for the price of books together with the ISBN code.
EAN8 is a smaller subset of EAN13.
EAN13, also known as Global Trade Item Numbers (GTIN), EAN are for identifying articles or products uniquely. EAN-13 encodes 2-digit country code, 5-digits manufacturer code and a 5-digits products code.
FIM (Facing Identification Mark) is used by the USPS to assist in the processing of letter mail.
GS1-128 (also known as UCC-128 and EAN-128) use Code128 with application identifiers to specify the format and application area of the encoded values.

Interleaved 2 of 5 (ITF) is a numeric only barcode used to encode pairs of numbers into a self-checking, high-density barcode format. In this symbology, every two digits are interleaved with each other to create a single symbol. An optional Mod10 checksum character can be appended to the code.
ISBN is the abbreviation of International Standard Book Number. It uses the symbology EAN-13 and can be optionally extended with 5 Add-On Digits.
ITF-14 is the GS1 implementation of an Interleaved2of5 barcode.
JAN (Japanese Numbering Authority) are EAN codes that use the number system "49".
MaxiCode is an international 2D barcode that is currently used by UPS on shipping labels for world-wide addressing and package sorting.
MSI, also known as Modified Plessey, is used primarily to mark retail shelves for inventory control.
PDF417 is a 2D barcode (stacked symbology) used in a variety of applications, primarily transport, identification cards, and inventory management. PDF stands for Portable Data File and was developed by Symbol Technologies. PDF417 uses built-in error correction to ensure better readability.
Pharmacode is primarily used in pharmaceutical areas.
PostNet was developed by the United States Postal Service (USPS) to allow faster sorting and routing of mail.
QRCode (Quick Response Code) is a matrix square barcode capable of encoding large amounts of plain text and binary data. Multiple levels of error detection and correction are supported.
Standard 2 of 5, also known as industrial 2 of 5, is a low density numeric only barcode where digits are encoded with 5 bars, 2 of which are always wide. An optional Mod10 checksum character can be appended to the code.
Telepen was designed in 1972 in the UK to express all 128 ASCII characters without using shift characters for code switching, and using only two different widths for bars and spaces.
UPCA, also known as GTIN-12, is used in the United States for marking of products in retail applications (similar to EAN).
UPC-E is a variation of UPC-A which allows for a more compact barcode by eliminating "extra" zeros. Since the resulting UPC-E barcode is about half the size as an UPC-A barcode, UPC-E is generally used on products with very small packaging where a full UPC-A barcode couldn't reasonably fit.