



Master thesis project: AI generated visual identifier

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Company description

Clockworks is a Rotterdam-based start-up specialised in the development of software solutions on the cutting edge of artificial intelligence & computer vision. With our motto being 'for the love of pixels' we have a strong passion for technology and developing innovative and creative solutions using the power of pixels. Our growing team consists of 10 people, most of which have technology backgrounds in fields such as artificial intelligence, computer science and applied physics.

Project description

Visual markers containing encoded information are used everywhere around us. Most used examples of this are barcodes, QR-codes, and data matrices.

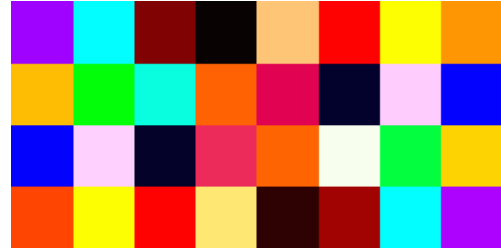
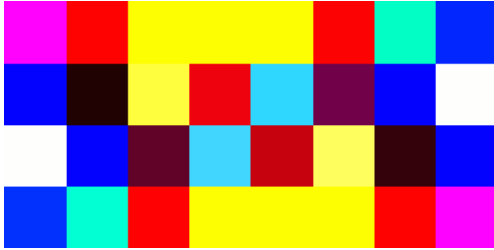
A barcode is nice, and when a barcode scanner is used up close, reading is very robust. However, using a camera instead of a scanner, reading a barcode is already quite a bit more complicated. This is of course why we see more and more QR codes. As these contain quite a lot of modules in a relatively small area (for redundancy purposes) however, they quickly become too small to read.

There are many cases where these visual identifiers have to be read in bulk, preferably tens-hundreds in a single image. Currently the maximum imaging distance (or minimum amount of pixels) at which barcodes and QR codes can be decoded is a limiting factor for this.

All existing visual identifiers have been hand-engineered for decoding using 'conventional' computer vision, including engineers' concepts for redundancy and robustness. In this thesis project you take another approach using A.I., hopefully leading to a next generation visual identifier that is much better suited for modern requirements. For now, we generated some codes with an autoencoder, using it's middle layer as a visual representation. But perhaps you can do it with a GAN? Or something else entirely?

You will experiment with having an A.I. create its own 'visual language'/representation based on a set of boundary conditions such as information density and robustness. A representation that is robust against wear and tear, and is also readable, with a smartphone camera, at a distance. This also means you will have to take into account the transformations that occur between computer generated images, printed images and camera captures of printed images.

This project is the perfect mix between deep learning and information theory. And you can set your imagination loose to find the best solution.



The results of our first AI-generated data encodings



Suppose we would want to know what products are present in this photo, can you come up with an AI-code that can be reliably read from this distance?



Practical information

- Duration of the project is 6-9 months (full-time)
- Starting date: flexible, preferably during the first quarter of 2022.
- Our office is based in Rotterdam
 - Goudsesingel, walking distance from subway Oostplein and train station Rotterdam Blaak
- Working from home is not a problem. If safety- and rules allow it, working in the office at least a part of your time is stimulated.
- Some form of physical test-setup might be applicable during the internship (for testing of image capture of generated identifiers), which will be located at the office in Rotterdam.
- Internship allowance applicable
- Having your own laptop is recommended. Remote server(s) for neural network training are available.

Contact information

Do you have a curious and independent mindset? A love for pixels (or an interest in developing one)? And are you eager to get hands-on with A.I.? Please send a copy of your resume and a small motivation letter to:

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