Digital Literacy and one of its Characters

Miro Roman

Miro Roman is an architect and a researcher. He is an Assistant Professor at the House of Coded Objects at the UIBK Innsbruck, and a senior lecturer at the chair for Digital Architectonics at ETH Zurich. The following contribution presents his work on developing informational characters, drawing from an abundance of books and images. Text and visual information are rendered commensurable via artificial intelligence in a networked dramatization of data points. These data points are interconnected through sophisticated computational processes which Roman further relates to poetry and literacy. This approach creates informational characters that are relevant to the method of identifying radio signals proposed by the Radio Explorations project. This identification would be based not directly on the knowledge of radio amateurs and contributors to SIGID wiki digital archive, but rather on its mechanics, character and informational similarity between the digital recordings of signals and AI driven synthetic alphabets. The characters in Miro Roman's play are articulated in terms of the specific datasets he is working with, and they enable identification of qualities and relations within streams of data flow. They are at the same time a part of a dramatic play and a synthetic alphabet.

I prepared a story to tell you. It is a short narrative in which I bring together images, texts, avatars and social media. I am interested in ways they relate to reality, to what we think is real. Are we real? Are avatars part of us? What is artificial intelligence? What is machine learning? Is it objective? How to encode things? In my understanding, it is always important to disclose a motivation, an interest for engaging with these

questions. Not to stay on the level of techniques but motivate these techniques in a certain direction.

I would like to introduce you to *Alice_ch3n81*. *Alice_ch3n81* is an avatar of mine, and I would say she comes from the plenty, from the Wonderland. She is an avatar, a bot, an alien. She is a part of me, but she is not me, so we are in some kind of relationship. We are related, but she is independent of me. She deals with a lot and that is a thing that I really appreciate about her. She deals with a lot of information, with datasets, with abundance of objects, and in this case, images and text. This is the story of *Alice_ch3n81*, and how am I able to articulate a character, by playing with big libraries, together with her. This character has consistency, and it is related to me. I take these datasets and characters like *Alice_ch3n81*, and then try to give her a voice, for instance, on Twitter. We will get back to this later. What is interesting about *Alice_ch3n81* is that she plays with data independently of media. She can play with pixels and images, with rock, cells, and chairs. She can play with words, text, and letters. Since she is my avatar, she is, like me, interested in architecture. She talks about architecture by looking at all the images and all the texts I am working with.

This is the paradox of information: if you have enough information, you can stretch it, squeeze it, encode it and it will tell a story that you want to tell, rather than showing the objectivity of the world. This is, I think, important to note about the information space we live in today, with Trump and social media. It is a space in which we anchor in something and say: "This is the truth". All seems to be constantly changing depending on how we want to see. It is an interesting moment in which what is subjective and what is objective is not clear anymore. To call it fake news is simply misleading.

How to then talk about things that we care for? How to talk about things that we really like, if we have all the books, all the images, all this data. At the CAAD chair at ETHZ, we tried to push the idea that we can approach coding and computation from the concept of literacy. If you are literate in coding, you can write an email, you can write a book, or a poem. The idea is to see coding on a level which is not about problem solving, but about articulating: coding in the sense of writing books, books

of a different kind. *Alice_ch3n81* is my story about becoming literate with coding. This would be an ambient where Alice_ch3n81 grew up, full of aliens, mutants, migrants, cyborgs, avatars. These creatures are neither mortal nor immortal. They are not from heaven, nor from Earth. What they share is a space of information and abundance they inhabit. I am interested in thinking about the kinds of objects these creatures use. What is their nature? How do we think of their nature? How do we then think of our nature? Are they related?

While there are more and more of these creatures, the more you focus on what they are, the harder it is to see them. They are never pure, but always a combination of different media, flavours, realities, fictions. There are no classical categories, labels, or boxes to contain them. One could say that these creatures live on a Google planet, they hang out among other avatars and aliens, and social media is the way how they transport themselves, how they render their faces. They like the web, they like information. Maybe they are information. In whatever way we look, they influence our world. They give us many faces. This, I think, is the beauty of social media. It gives us the ability to have as many faces as we would like to have. I can have many identities, and Alice_ch3n81 would be one of my other identities.

On Figure 1, I present *Alice_ch3n81*, and a chair that we designed together. This is the first meeting of me and Alice_ch3n81. This chair is similar to Alice_ch3n81, in the sense that it is composed out of other chairs. It has many faces, many identities in itself. This object is constantly morphing, and it is one click away from becoming real.

Alice_ch3n81 is my avatar and her biggest passion is architecture. When she is 'alone at home', she is addicted to surfing and navigating architectural blogs. She behaves like a search engine: snapping, indexing, filtering. She is doing this using small poems (scripts). With such a poem, she can scrape everything there is on popular architectural blogs like Dezeen or ArchDaily, all the posts that are posted today, and all the images of the first article. Then she can get the second article, and one by one she gets all of them. By running such a poem for one evening, Alice_ch3n81 gets everything that was ever published on the ArchDaily blog. One poem, one evening, half a million images. Two poems, two

evenings, one million images. Ten years of online publishing. We are then in the noisy space of all the buildings that were built and published. All the furniture. All the drawings and all the architects, their publications and books. It is counted in millions, and it is just getting more.

Figure 1: Alice_ch3n81 and the EigenChair, from Four Chairs and all the others.

Courtesy of Miro Roman

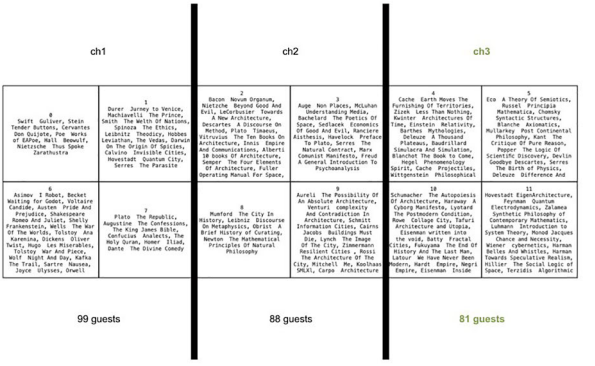
How could one think of encoding these images? I first bring them to the same resolution, into a square form and then start inventing stories. The most basic way how to transform an image into numbers is to reduce the resolution and read out RGB values. Another, slightly more sophisticated way is to search for the frequency of a structure in a specific part of a picture, by cutting the image into small squares, making an edge drawing of it, and then counting the number of white pixels. Mathematica software has different ways to measure common properties of images. You can measure the entropy of an image. You can transform this image using Fourier transformation, into complex numbers, and then take only their real or their imaginary parts. You can use feature extraction functions to extract features from six images of animals, and it comes

back with a set of numbers. To encode images, you bring them to a space of numbers.

Figure 2: Weather of images from Dezeen.

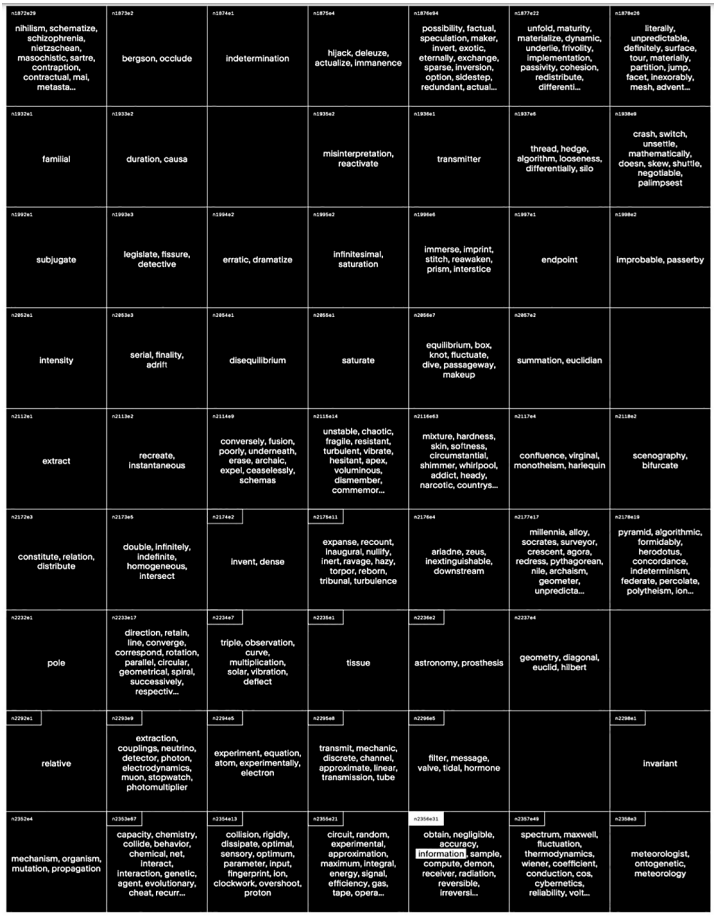
Courtesy of Miro Roman

Figure 3: Cells with clusters of books in a self-organising map.



Courtesy of Miro Roman

Figure 4: Information Galaxy.



Courtesy of Miro Roman

Interesting things can happen. I can say that one blog is one character and I talk to it, or I can mix these blogs, and make mutants out of them. I use the self-organizing map (SOM) machine learning algorithm for clustering. I take all the images of ArchDaily and Dezeen, and make a

cloud, a weather of architecture in the past ten years, an impression or a face of it. It speaks of what has been happening in architecture in terms of weather. I can get a structure of images based on the colour of pixels, clustering images by structure and by form without having any input on what these elements mean. If we then take any two images, for instance a chair and something else, there will be infinite ways how we can relate them. We can relate them through the shortest path between them; or we can find random curves to relate them. The way we choose to relate the two images will be our story.

Regardless of there being any truth in them, we can work with these relations. They are true and fake at the same time. They are true because there is a mathematical procedure how we got to them, but they are also arbitrary because everything is in some way connected to everything else. If I now take any of the clusters, if I unfold these images, I am extracting the atmospheres out of the weather. These atmospheres are super consistent in themselves. For some of them, there is a certain consistency of colours or structure, which goes beyond detecting objects or form. There is a consistency in them without us being able to pin down what it is. One could use this to make branding for celebrities or for rising stars in music. As an exercise, I can take a few flavours out of this, and make a kind of a 'brain': a brain for Alice_ch3n81. Or I can create a certain sensibility with which Alice_ch3n81 can look at images.

Out of the weather, I take specific flavours and I bring them into a profile. I can get a profile about patterns – here Alice_ch3n81 likes patterns. She likes textures. She likes complicated images. In another instance, she looks at drawings, it is a completely different profile. I can have one profile on Monday, another profile on Tuesday. I can play with them, and depending on this, Alice_ch3n81 can post different posts on social media.

The other hobby of Alice_ch3n81 is dealing with text. With information technologies, we can work with images and text in exactly the same manner. This should, in principle, work with sound as well. If we are with

books, there is a library called Project Gutenberg,[1] containing all digital books that are free of copyright. By writing the kind of poems I mentioned earlier, you can get all those books. I am downloading all the books as we are speaking. I do not care what they are about. The same is with images. There is no need to look closely at what is there. From Project Gutenberg, I can get 60 000 books. Then I find myself in exactly the same setup as I described previously with the images. We have here financialization of housing, voodoo histories, coming to terms with suicide, politics, trauma, tea, Islamic philosophy, Slavoj Žižek, super random books.

In order to look at these books, we take the brain of Alice_ch3n81, which is made from text now. I use this brain in order to look at the books that I do not know. When encoding or making informational faces from text, I take the whole text of a book and it becomes a connectivity of its own words. I remove the stop words, lemmatize the text and turn it into a graph of words. I then make matrices. Speaking of what it means to articulate an object in its own terms, I can choose the way to approach the library, an object, via words. If we are with Google Books, then it is made of all English words. This would be the generic dictionary of everything. But if we are in a specific library, then we take only the words that really appear in its texts. I would call this articulating an object in its own terms: I am using the words that are in the books and I am abstracting from the length of the text. The articulation is accommodated inside the dictionary, and I am just counting. For instance, the word "say" appears in the first book 120 times, and in the second book 350 times. I do this counting for all the words. One word, in this way, reflects a book and the library at the same time. Vertically it is a book, and horizontally it is the whole library. The library gets something which I call an informational face. Then books are translated to another space. We pay attention to exactly which library and how do we encode them, which data we take, and how do we think of ways in which we encode the data. A library can be encoded in terms of words. You can have synonyms. You can have letters. You can have bigrams, trigrams. You can take Google ratings. It is

1 Project Gutenberg website, https://www.gutenberg.org/ (accessed 21.06.2022).

still open to think how this could be encoded. These two things are the double articulation. These processes give consistency to what we work with.

Once we have a library encoded in terms of books, it is important that I know something about all the books. I know that the Flat Land is a book about creatures in the flatland. I know Alberti. I know what a book by Žižek is about. I have not read all the books, but I have an idea what they are about. This library becomes a compass to look at the relations.

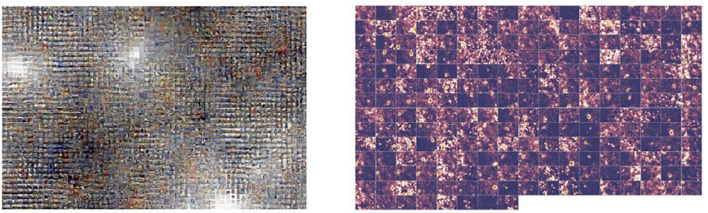
The library of books that I know, I call *Xenotheka*. I cluster the books in a specific way: in one cell there is Gulliver, Cervantes' Don Quixote, Asimov and Victor Hugo, James Joyce Ulysses, literary stuff. In the cell at the opposite side of the spectrum is Eco's Semiotics, Russel's Principia Mathematica, Chomsky with his language discussions. Then in another cell: mathematics and cybernetics. All of this clustering happened just by counting words. I then divide these into three characters (Figure 3). I am mostly interested in the third character: a technical way to think about language and architecture. I take all the books that I had from before and I project them on top of this. Then I know, for instance, that from the whole library, there are 81 books that came into the third character's cells. These books should have more in common with this character. They should somehow have similar flavours. If I unfold them, and I just take the titles of the books, I see that there is a lot about the 'digital'. Then I make word clouds, and I divide them again with SOM into four cells. The first is about 'design' and 'architecture'; the second is described by 'film', 'image', 'fashion' and 'cinema'; the third with 'digital technology', 'space', 'image', 'new'; the fourth includes a little bit on contemplation. In this way, I am getting a feeling of what this character might be about, even though I have never read the books.

This is the body of my new Alice_ch3n81. It is made of books. One thing was to cluster books, but if we invert the matrix, we can cluster words. This makes a brain for Alice_ch3n81: it is a kind of a galaxy of concepts. Each book can light up the galaxy in a specific way. If we look at, for instance, *information*, what we are going to get in this specific setting is not the definition of information, but what might information be in this context. It is close to Maxwell's 'demon', it is about 'radiation',

'spectrum', 'conduction', 'entropy', 'meteorology', 'filtering', 'transmission', and so on. We also have 'solar', 'electrons', 'electrodynamics', 'stop watch', 'photo multiplier', 'equation', 'atom'. It is about understanding information in the context of electricity and atoms: a kind of electric information.

The other term that I was looking for is *data*. It is related to information, but they have a completely different connotation in this setting. 'Data' here is around 'computer', 'airline', 'mail'; 'messy', 'keyboard', 'processor', 'laser', 'xerox', and so on. It is in the context of applications. In this setup, *information* is electric and atomic, and *data* is on the level of infrastructure and applications. I get all this just by counting words. What is important is that you find a way how to relate things to each other, to interpret what this might be about. Of course, these are arbitrary interpretations. But there is some consistency in what a cell is 'saying'. It is more complex than with images, with images we always see the whole thing. With words, the books and the words are coming, but you do not see exactly what is going on.

Figure 5: Two brains of Alice_ch3n81: images (left) and books (rights).

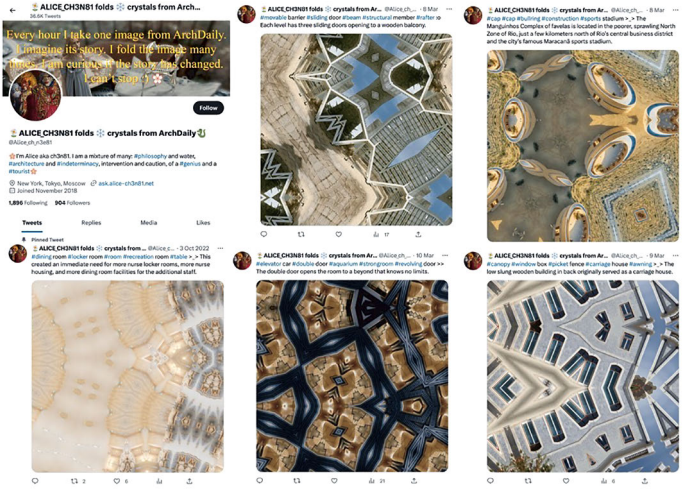


Courtesy of Miro Roman.

Later on, I start talking with Alice_ch3n81. I am developing an application where you can chat with this machine intelligence. You can choose to talk about information. Then we can ask Alice_ch3n81 about "articulating an object in its own terms" (see Figure 6). We can choose here different brains of Alice_ch3n81, different libraries. Alice_ch3n81 returns

sentences from books which have something to do with the question we asked. There is almost an infinity of results that are coming. With K. Michael Hays, Architecture Theory Since 1968, for instance, the object language is questioned in its own term. You get the flavours of what is important for this concept for that galaxy.

Figure 6: The Twitter account of Alice_ch3n81.



Screenshot provided by Miro Roman.

Now, somehow, our Alice_ch3n81 has two brains. One is made of images, and the other is made of text. The brain of images is coming from half a million images I have never seen, and the brain of text comes from 13,000 books that I never read. Still, these books and these images have something to do with me, because I selected these 'flavours'. Alice_ch3n81 is a part of me but not really: we are related. It is a synthetic relation, and I can multiply it as much as I want. When I place these relations in time and space, I get a kind of consistency. This is what happens on Twitter: I take a random image from the brain of images, and I ask machine in-

telligence to recognize what is in these images, and to relate that to the libraries. I am getting Alice_ch3n81 to comment on the images. There are two sets of data which are related by a relation that I make. Alice_ch3n81 looks at this image using an image detection algorithm, and she says: 'scuba' 'ventilator' 'device' 'instrumentation' and 'artefact'. With this as a question, she is consulting the libraries. She gets all the answers, out of them she chooses one randomly, and posts this as a post on the Twitter. There, she has 1000 followers, and is following 2000 people, sending an image with a description once an hour. She is also able to retweet things.

Alice_ch3n81 is a character, able to act and talk, but unlike regular actors, she operates without a given script. She can find different ways of relating information. I think of Alice_ch3n81 as a character via which one can navigate the internet and play with these informational techniques.

Discussion

Simone Conforti: We seem to be working with neural networks which are not doing deep learning. We are simply trying to classify stuff. But if we would do deep learning as engineers do now, we could understand more deeply why there is a relationship. The margin of interpretation would be smaller. Rather than just reproducing an organized space, deep learning is actually learning. I am wondering what would happen, in the case of Alice_ch3n81, if she would become an intelligent agent. At the moment, when we work with self-organizing map and other neural networks, we tend to think that the bigger the dataset, the better the result. But in my work with deep learning, I realized this to be false, because the point is in designing good datasets, rather than giving whatever to the network. I wonder if we can imagine the Alice_ch3n81 character operating through a network which is doing something more than organizing information, trying to really learn semantic relationships. Those networks could then also give us the reason why they create the relationship between the data, rather than just guessing.

Selena Savić: The way I see the specificity of this work with Alice_ch3n81 is in the question who do we want to do the work. Do we want the algorithms to generate things for us, or do we want to invent things in the organized space that the algorithms give us? In case of the latter, the importance is in understanding these techniques in terms of instruments: you can play almost anything on an instrument and you have to decide what this is going to be. This is perhaps comparable to how Carl Colena talked about reflections off the meteor: there is an active radio transmission, then there is a meteor coming at some point, we reflect on that, and we get some meaning. What I hear in the talk about Alice_ch3n81 is a proposal to work with the possibility to invent with these tools as instruments, as opposed to using them as tools to do something.

Miro Roman: This is the crucial difference. With both networks and deep learning, it is crucial how you collect the data: which data you take and how you will encode it. All this is subjective, dependent on our affinities, or feelings, on how you want to work. It is very important to stress that this does not reflect the world: it reflects me in the world.

If we would say that this is the world and go to policy makers to present them this as 'the truth', it would create a very aggressive setting. It would present itself as a scientific explanation for implementing a certain strategy. I think with data and AI we need to be much more sensitive and nuanced.