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Draft synopsis

We want to analyse the development of CAPTCHAs and furthermore discuss and reflect upon the advancement of Artificial Intelligence along with the CAPTCHAs, and also the ethical perspective of learning computers to judge and generalize humans.

What is CAPTCHA?

CAPTCHA (**C**ompletely **A**utomated **P**ublic **T**uring test to tell **C**omputers and **H**umans **A**part) has been used for many years on the internet to tell if the user is a robot or not. It has been a way for the program to secure that the webpage or service wouldn't be flooded with spam or other unwanted messages or requests.

The first examples of known CAPTCHA were made by hackers who didn't want the computers to monitor specific keywords in what they were writing. So they came up with a way of going around these filters by creating words with other letters or numbers that might look the same (ex. 3 and E). This way of writing has later been called *Leetspeech*[1]. This new way of writing made it possible for users to write words that wouldn't be readable for a computer. And this concept laid the ground for CAPTCHAs as we know them today.

The most common CAPTCHA we see on the Internet is build upon the Leetspeech. [2] Here the user is asked to write the characters they can see in the picture. If the word or sequence of letters and numbers is too hard to read for the user you can ask the CAPTCHA to generate a new sequence of letters. The user can also ask the program to read out loud what the characters says.
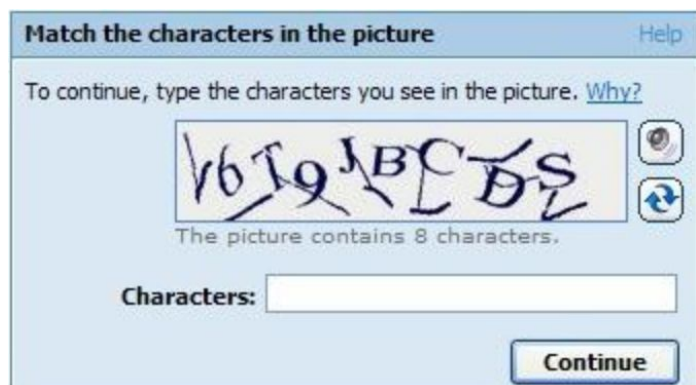
Another well known CAPTCHA can also be made up of different images where the user could be asked to select all the images that has something specific in them (like a storefront).

So to sum up, CAPTCHAS can look very different, but their main purpose is the same: to provide security for a webpage by making sure the user who is trying to access the site is indeed a human and not a spam-bot.

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[1] https://h2g2.com/edited_entry/A787917

[2] https://www.nytimes.com/2018/02/26/crosswords/what-the-heck-is-that-captcha.html

Our program

For our final project we have designed a program that will challenge the human user to complete different puzzles/CAPTCHA's. The program will have a leveling system consisting a line of different CAPTCHAS. Once the user has completed a CAPTCHA the program goes on to the next one which will be harder than the previous. Our general idea for the code is to make each CAPTCHA/level into its own function. In this way we can differentiate between levels and keep the code behind each CAPTCHA apart. The result will be 'if'-statements that check the state/progress of the program and display CAPTCHAs accordingly. Each CAPTCHA might include its own unique code depending on the kind of puzzle that we want to make, whether it's a exercise in listening, seeing ect.
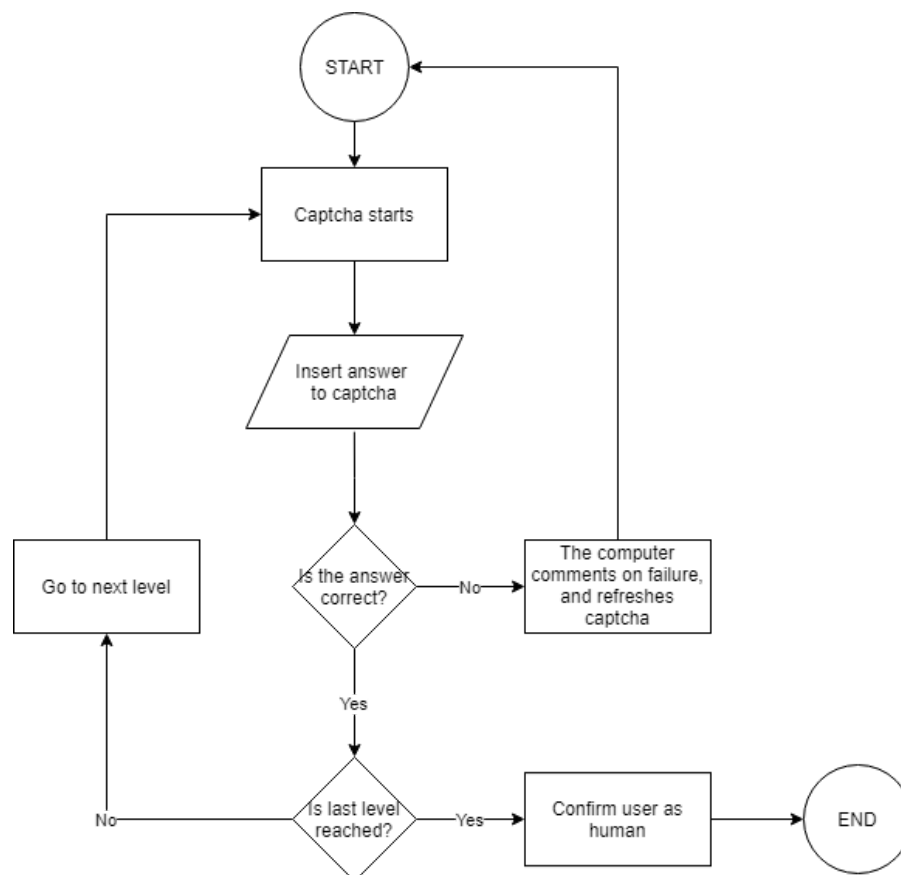
Another aspect in the code is the idea of giving the computer a voice, even though it's not executable. We want to include an aspect in the program, where the computer's "thoughts" and "opinions" will be displayed in the code. Here we'll interpret, what the computer might think when trying to differentiate the user as either a computer or human. In these thoughts we want to bring in some kind of humor as it characterizes human nature. This could be done through naming variables something like 'TheEasyOne' instead of 'CAPTCHA 1'. Thoughts could also be presented as comments (//) that are usually made by the creator of the program. This would also further support the idea of the computer questioning the user and therefore 'designing' itself or a program to do so.

Concept behind our program

As mentioned earlier, the point of the creation of CAPTCHAs is to identify whether the user of the computer/program is a robot or a human being, normally because robots are associated to spam and virus activities. In our project the program is designed to be unreasonable and too challenging, because it's programmed to make the human fail this CAPTCHA identification. Through this program we want to emphasize how the computer is judging our "humanness" based on some parameters and algorithms that someone has determined for the program. This questions the notion of subjectivity in software and also software development. The program also reflects how modern CAPTCHAs are forced to become harder[3] to solve along with the advancement of AI technologies, and most places the CAPTCHA has even been replaced with hidden CAPTCHAs[4], reCAPTCHAs[5] or hidden authorizations for example by collecting the user's IP-addresses and warning the user in cases of suspicious activity. Is this maybe a result of the advancing CAPTCHAs and AI technology?

The aspect of telling humans and robots apart, has been researched throughout history of programming by Alan Turing, known for the Turing Test, that claimed that computers could imitate human rationality. And since CAPTCHA is an acronym for **C**ompletely **A**utomated **P**ublic **T**uring test to tell **C**omputers and **H**umans **A**part, it would be appropriate to explain what the Turing test is. It's a test that tests a machine's ability to have the equivalent intelligence of a human. The standard execution of the test consists of a "blind" conversation (in natural human language) between a human - who cannot see the other part - and a machine which is designed to generate human-like responses. The human will then determine and evaluate whether or not he/she is having a conversation with a machine or a human. The CAPTCHA is thereby often described as a reverse Turing test, since it's a test administered by a computer instead of a human.

Our CAPTCHA program also touches upon the theme "Language and code". Because, our aim is to differentiate between the way code, in our instance CAPTCHA, is executed and understood by humans and furthermore the semantics that occur in our natural language. What is the differences and is it possible to find similarities? As Geoff Cox says:
"The act of coding might be seen as the translation between a problem expressed in human terms of speech and one expressed in a way the computer can interpret - between ambiguous and complex expression and formal logic" (Vocable Code, Geoff Cox).

Natural language gives humans the ability to express their thoughts, needs, desires and so on. And there are often several ways in which we can express ourselves. There is not one simple answer and human expression depends on our past and individual experiences, personality and identity that all form our perception, intelligence and semantics. Language is therefore something that makes us unique from each other. Code on the other hand leaves one solution for a problem and doesn't contain any form of inherent and existential

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[3] https://www.nbcnews.com/technolog/why-captchas-are-getting-harder-read-1C7657741
[4] https://www.drupal.org/project/hidden_captcha
[5] https://www.google.com/recaptcha/intro/android.html

intelligence or personality. This is something that can be seen in the CAPTCHA and is an issue since it lacks the dimension of human expression and semantics even though it's designed to determine the user's humanity.

Reference list

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