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**New possibilities in the pixel-based cryptography**

Dr. László Pitlik (<https://orcid.org/0000-0001-5819-0319>),

László Pitlik (Jr.) (<https://orcid.org/0000-0002-8058-9577>)

Mátyás Pitlik (<https://orcid.org/0000-0002-1991-3008>),

e-Mails: [pitlik@my-x.hu](mailto:pitlik@my-x.hu), [ptlklszl@my-x.hu](mailto:ptlklszl@my-x.hu), [ppk@my-x.hu](mailto:ppk@my-x.hu)

Kodolányi János University and MY-X research team Hungary

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**Abstract**

History: The trans-institutional MY-X research team produced till now more qualitative ciphering solutions in order to demonstrate the quasi unlimited possibilities of transformations being capable of hiding information: e.g., <https://miau.my-x.hu/miau2009/index.php3?x=e0&string=cipher>, <https://miau.my-x.hu/miau2009/index.php3?x=e0&string=aesthetic>, <https://miau.my-x.hu/miau2009/index.php3?x=e0&string=jav%C3%ADt%C3%B3kulcs>

Background and benchmarks: The well-known Caesar-codes define a small combinatorial space – easy to identify it. The Caesar-codes are always focusing on letters/numbers/characters. But the digitalisation represents these characters in form of pixel-matrices. Dot-matrix-fonts in dot-matrix-displays let flash certain pixels for a particular letter. Therefore, digital/binary Caesar-codes could be created if the active and passive pixels (see 1;0) would be modified – in a rule-based form.

Highlighted details: The focusing on the pixels of the digitalized letters makes it possible to involve new transformations into the coding-decoding processes: e.g., pixels for one letter or even for arbitrary letters (see an entire picture – where in case of hand-writing-messages the recognition module can also be part of the decoding process) can be transformed into a circle in different ways, where the Caesar-code-like shifting can be interpreted immediately. Not only simple shifting-patterns can be defined, but also rules for cellular automata. These rules can even be so complex, that the decoding is quasi impossible, or this becomes a new combinatorial challenge. The digital representation of letters can also be seen as a door to the genetic algorithms with their specific transformations (like mutation, crossing, etc.). Patterns for binary pixel-values can be created based on different series like Fibonacci or even specific randomized inputs like pi. Digitalized pixel-values can have numeric contents (like in case of grey-scale-pictures). With these numeric values, new (quasi arbitrary) transformations can be initialized. The above-mentioned possibilities are not direct concurrent approaches for the well-known cryptographical solutions (see private/public keys), where the quantities become qualities (in case of limited computational capacities).

Future aspects: The pixel-oriented approaches can rather be compared to the old/rare native languages used e.g., in the second world war e.g., by Americans e.g., against Japanese (c.f. code talkers). Therefore, the above-presented pixel-based approaches can be used in case of specific demands: communication between business partners, agents. These qualitative techniques make possible to hide graphical plans as a kind of non-figurative picture. Specific watermarks can also be created based on pixel-transformations. These solutions can be combined with quasi arbitrary other effects (c.f. letter-statistic-homogenisation, blurred contours of letters, more substitutions for one original input, etc.).