Topology in Cryptographic Coding

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Abstract

The present paper aims at developing a new cryptographic coding method using topological tools. Data is transferred in various applications through open networks to allow communication and sharing of information. Without security, data can be stolen, modified or intercepted by unauthorized users and can be misused. Unauthorized interception is prevented by transferring data into codes using random keys so that it can only be accessed by an authorized person. Various methods such as Ceaser cipher, Vigenere cipher are known for securing information. Cryptography is the study of securing information in data transfer. On the other hand, Topology is a branch of mathematics that studies those properties of spaces that remain unchanged under stretching, bending, or twisting, such as connectedness, path connectedness, compactness etc. In the present work, letters of English alphabet in Calibri (body) font (known for their simple appearance on digital screens) are classified using topological properties such as connectedness and number of components after point deletion in alphabets. Using this classification, a numbering of alphabets, called "topological numbering", is introduced which is different from the standard one. Subsequently, keys are introduced that indicate the chosen numbering- "topological" or "standard", in the ciphertext besides having other random features. This leads to a new method based on topological ideas for encryption of messages enhancing security in data transfer. The present work establishes a connection between two major branches one of Computer Science and the other of Mathematics, namely Cryptography and Topology by introducing a new topological encryption method.