

Researchers discover the key to optimizing information transfer

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Credit: Ecole Polytechnique Federale de Lausanne

EPFL researchers have come up with a way to optimize information transfer, solving a problem that has confounded researchers for 60 years. Their breakthrough could enhance the quality of our communications, from smartphones to satellite transmissions and data storage.

We all need to send and receive data, such as when downloading a

movie, saving photos to a hard drive and talking on the phone. But noise on these communication channels can lead to data loss. Is this avoidable? It may be hard to believe, but this problem has stymied researchers since the 1960s.

EPFL researchers have now unlocked the mystery, and their work has won an award at the Symposium on the Theory of Computing (STOC 2016), which recently took place in the United States.

Their work consisted in defining how to send enough data to account for potential data loss but without overloading the channel, which would undermine the speed of [information transfer](#). The starting point of the analysis was designing code to represent a repetition scheme capable of eliminating noise while transferring the data. On the receiving end, the researchers made a revolutionary discovery: the symmetry of the code alone implies optimal performance.

They showed that a larger-than-expected family of codes led to a good result. "We determined that, if we know the communication channel that will be used, we can precisely identify the best code to be used," said Marco Mondelli, a researcher at EPFL's Communication Theory Laboratory and one of the article's authors. "It just needs to be structured and symmetrical."

This discovery could lead to developments and improvements in information transmission in all fields. This could, in turn, improve the performance of computers, mobile phones and data storage systems.

More information: Reed-Muller Codes Achieve Capacity on Erasure Channels. arxiv.org/pdf/1601.04689.pdf

Provided by Ecole Polytechnique Federale de Lausanne

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