

Cyclic Codes in Algebraic Coding Theory

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Abstract

When communicating across a channel, it is inevitable that such pathways of communication be "noisy", thus there is always some sort of interference across the channel. This results in messages not always being received as they were sent. In order to solve these problems, coding theory developed and is used both to detect and correct errors. It is used for data compression, error correction, cryptography and network coding. In error correction, a concentration on algebraic coding theory lies with linear codes, including cyclic and constacyclic codes. In this poster presentation, we will discuss the history of coding theory, going in depth with cyclic and constacyclic codes, as well as discussing applications and current problems being resolved using algebraic coding theory.

Claude Shannon, American mathematician, electrical engineer, and cryptographer wrote a paper titled "A Mathematical Theory of Communication" in 1948.

Not related to what you say but what you could say.

Focused on the best way to encode information that a sender wants to transmit.

Introduced the term "bits" to reference a binary digit.

H =Shannon Entropy, measure of information in a message in bits;
 $p(x)$ =Probability of a certain symbol, x , turning up; $\log(p(x))$ =Number of bits needed to represent x

Used probability theory to prove

~10 years later Cyclic codes discovered

~10 years later Negacyclic codes discovered

Constacyclic codes discovered

Definitions

∞ Coding Theory is the study of methods

for detecting and correcting errors in data transmission.

∞ Error correction codes are a subset of coding theory.

∞ Error detection codes are a subset of coding theory.

∞ Error correction codes are used to detect and correct errors in data transmission.

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