Reed solomon code applications

Engineering

Reed Solomon Codes Applications

Introduction:

Reed Solomon codes are the codes that are mainly used for correcting errors, and are based on blocks. This report studies and presents the applications of Reed Solomon codes, which are mainly found in digital communications and storage of data (Reed Solomon Codes, 1998).

Applications of Reed Solomon Codes:

The applications of Reed Solomon codes are mainly obtained in data storage and digital communications. The following major applications can be listed for Reed Solomon codes –

Data Storage – In case of both CDs, and DVDs, it is possible to apply codes for correction of errors and measure the raw errors before correcting them. The application is in holographic data storage or optical storage and the two major schemes that are applicable include Cross-Interleaved Reed-Solomon Code (CIRC) for CDs and a Reed-Solomon Product Code (RS-PC) for DVDs. Each bit of data is considered for a firm decision by both these codes to understand if the bit is 1 or 0. Following this, the correction scheme of the codes can fix the errors in the data storage devices (Curtis et al, 2011). The application is most effective in cases where error occurs in bursts. Reed Solomon codes are capable of correcting up to 2 byte errors per 32 byte block. Up to 4000 bits of error bursts can be corrected by CIRC as a result of the features and applications of the codes (Prosch and Daskalaki-Prosch, 2011, p. 64).

Data Transmission – Reed Solomon codes can be used in several applications for the purpose of transmission of data. Data can be transmitted from the

receiver to the transmitter. The applications include transmission systems for mobile data, and for highly reliable military systems of communications (Wicker and Bhargava, 1999, p. 10). There are specialized forms of RS codes enabling data transmission, such as Caucy-RS and Vandermonde-RS where the code performing the task is an RS(n, k) code (Kythe and Kythe, 2012, p. 85).

DVB-T Transmission – Digital Video Broadcasting or DVB-T comprises of a bandwidth of 8MHz. For purpose of transmission, it needs correction of its errors, and Reed Solomon codes can be effectively applied in this case. It is used as an outer code (204, 188, T= 8). The error control takes place by combining the Reed Solomon codes with inner convolutional codes (Lamba, Biswas and Pathak, 2005, p. 372).

Space Transmission – In several planetary exploration events set by NASA and ESA, the use of Reed Solomon Codes has already been done. With combined use of convolutional and Reed Solomon codes, it has been found to be possible to gain coding at high levels. The Reed Solomon codes can be used to correct errors. The Voyager expeditions represent the most popular case of applications of the Reed Solomon codes, led to other planets such as Uranus and Neptune. These codes could be used for transmission of images from these external planets and hence communicated to earth (Wicker and Bhargava, 1999, p. 9; Houghton, 2001, p. 144).

Conclusion:

The above discussed applications are the most essential and common applications of Reed Solomon codes, which have proved to be extremely effective in error corrections and transmission of data.

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