The Discrete Cosine Transform

The 1-D discrete cosine transform (DCT) is defined as:

$$y[k] = C(k) \sum_{n=0}^{N-1} x[n] \cos \left[\frac{\pi (2n+1)k}{2N} \right] \quad 0 \le k \le N-1$$

where
$$C(0) = \sqrt{\frac{1}{N}}$$
 $c(k) = \sqrt{\frac{2}{N}}$ $1 \le k \le N - 1$

- DCT belongs to the family of sinusoidal transforms. Its basis functions are sinusoidal waveforms.
- It can be computed from the DFT. Therefore it has fast algorithm derived from the FFT.



Discrete Cosine Transform For Dummies

Hideki Imai, Ronald L. Rivest, Tsutomu Matsumoto

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Digital Signal Processing with Matlab Examples, Volume 2 Jose Maria Giron-Sierra, 2016-12-02 This is the second volume in a trilogy on modern Signal Processing The three books provide a concise exposition of signal processing topics and a guide to support individual practical exploration based on MATLAB programs This second book focuses on recent developments in response to the demands of new digital technologies It is divided into two parts the first part includes four chapters on the decomposition and recovery of signals with special emphasis on images In turn the second part includes three chapters and addresses important data based actions such as adaptive filtering experimental modeling and classification Cosine Transform K. Ramamohan Rao, P. Yip, 2014-06-28 This is the first comprehensive treatment of the theoretical aspects of the discrete cosine transform DCT which is being recommended by various standards organizations such as the CCITT ISO etc as the primary compression tool in digital image coding The main purpose of the book is to provide a complete source for the user of this signal processing tool where both the basics and the applications are detailed An extensive bibliography covers both the theory and applications of the DCT The novice will find the book useful in its self contained treatment of the theory of the DCT the detailed description of various algorithms supported by computer programs and the range of possible applications including codecs used for teleconferencing videophone progressive image transmission and broadcast TV The more advanced user will appreciate the extensive references Tables describing ASIC VLSI chips for implementing DCT and motion estimation and details on image compression boards are also provided The Computer Music Tutorial, second edition Curtis Roads, 2023-06-06 Expanded updated and fully revised the definitive introduction to electronic music is ready for new generations of students Essential and state of the art The Computer Music Tutorial second edition is a singular text that introduces computer and electronic music explains its motivations and puts topics into context Curtis Roads s step by step presentation orients musicians engineers scientists and anyone else new to computer and electronic music The new edition continues to be the definitive tutorial on all aspects of computer music including digital audio signal processing musical input devices performance software editing systems algorithmic composition MIDI and psychoacoustics but the second edition also reflects the enormous growth of the field since the book s original publication in 1996 New chapters cover up to date topics like virtual analog pulsar synthesis concatenative synthesis spectrum analysis by atomic decomposition Open Sound Control spectrum editors and instrument and patch editors Exhaustively referenced and cross referenced the second edition adds hundreds of new figures and references to the original charts diagrams screen images and photographs in order to explain basic concepts and terms Features New chapters virtual analog pulsar synthesis concatenative synthesis spectrum analysis by atomic decomposition Open Sound Control spectrum editors instrument and patch editors and an appendix on machine learning Two thousand references support the book s descriptions and point readers to further study Mathematical notation and program code examples used only when necessary Twenty five years of

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continues the story of music engineering begun in Volume 1 focusing on the digital and computational domain Loy goes deeper into the mathematics of music and sound beginning with digital audio sampling and binary numbers as well as complex numbers and how they simplify representation of musical signals Chapters cover the Fourier transform convolution filtering resonance the wave equation acoustical systems sound synthesis the short time Fourier transform and the wavelet transform These subjects provide the theoretical underpinnings of today s music technology. The examples given are all practical problems in music and audio Additional material can be found at http www musimathics com Transform, Second Edition Humberto Ochoa-Dominguez, K. R. Rao, 2019-04-18 Many new DCT like transforms have been proposed since the first edition of this book For example the integer DCT that yields integer transform coefficients the directional DCT to take advantage of several directions of the image and the steerable DCT The advent of higher dimensional frames such as UHDTV and 4K TV demand for small and large transform blocks to encode small or large similar areas respectively in an efficient way Therefore a new updated book on DCT adapted to the modern days considering the new advances in this area and targeted for students researchers and the industry is a necessity Materials of the Tutorial Lectures in Systems Sciences ,2001 Materials of the Tutorial Course EECS 750, Fall 1988 University of Michigan. Department of Electrical Engineering and Computer Science, 1988 An Introduction to Source Coding Raymond Veldhuis, Marcel Breeuwer, 1993 This book provides an introductory survey of current research in the broad discipline of source coding Part one is mainly theoretical and provides the background to source coding part two then discusses extensive examples of source coding systems for sound signals and images at all times relating these back to the key theory presented in part one Key features of the text include a unifying approach to source coding a systematic introduction and explanation close relation of theory with applications and extensive examples illustrations and exercises An Introduction to Source Coding will be an invaluable textbook for those on university courses and also a valuable reference work for post graduates and researchers **Teleworking Explained** Mike Gray, Noel Hodson, Gil E. Gordon, 1993-12-14 Provides advice on how to implement a teleworking programme including briefing and training of potential teleworkers Includes information on how to maintain security and confidentiality within a dispersed workforce Presents a detailed account of the technology which enables and supports teleworking including ISDN electronic mail facsimile mobile and satellite communications systems video telephony and audio conferencing A range of computer networks and programmes are also assessed **ISMIR 2002** Tutorial, 2002 Discrete Cosine Transform: Algorithms, Advantages, Applications K. Ramamohan Rao, P. Yip, 1990-08 This is the first comprehensive treatment of the theoretical aspects of the discrete cosine transform DCT which is being recommended by various standards organizations such as the CCITT ISO etc as the primary compression tool in digital image coding The main purpose of the book is to provide a complete source for the user of this signal processing tool where both the basics and the applications are detailed An extensive bibliography covers both the theory and applications of

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