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Research Article

Transmogrification Of The Hevc Using Dct And Dwt As Hybrid Transformation

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Abstract: While Watching Online Videos In Real Time Applications Like Youtube, Whatsapp Etc We Got An Experienced Like Bad Video Streaming And Poor Resolution Due To The Unlimited Usage Of Internet. Years Ago Many Video Coding Standards They Have Been Found To Improve The Efficiency Of The Video Content And Performing Well Also. One Such Popular Video Coding Standard Is H.265 Or High Efficiency Video Coding [Hevc] Has Unique Flexible Powerful Architecture Which Has To Be Used In Different Kinds Of Applications With Enhanced Compression Ratio And Resolution, But Still It Has Some Limitations Due To The On Growing Demands In Real Time. One Key Idea Is Proposed To Overcome This Limitation By Transmogrify The Hevc As A Hybrid Video Codec Standard And This Method Is Proposed As A Hybrid Method Because It Merges The Different Transformation Techniques Such As Dct And Dwt As A Combined Approach For Hevc Which Yields Better Compression Ratio And Improved Quality.

Keywords: Dct, Dwt, Hevc

I. INTRODUCTION

Since The Years Ago There Was A Significant Enhancement In The Quality Of Electronic Products Like Ultra High Definition Television (Uhd Tv) With Up To 8k Resolution And Also The Video Streaming Over The Internet Has Been A Significantly Growth In The Last Few Years Which Cause A Bad Need To Increase The Bandwidth Of The Internet, For This Reason One Popular Video Coding Standard Is High Efficiency Video Coding [1] (Ahmed Et Al. 2018) (Hevc) Has Been Developed. Basically H.265 Is Freely Available Software Library System And Application For Encoding And Decoding Video Streams Into The H.265/Hevc Mpeg – H Part 2 In The Iso/Iec Compression Format And Is Released Under The Terms Of The Gnu Gpl 2 License And H.265 In The Itu-T Standardization Organizations. High Efficiency Video Coding Was Developed To Decrease The Required Bit Rate Of The Video For Storage Or Transmission And To Enhancing The Video Coding Efficiency Compared To The H.264 / Avc [13]. The H.265/Hevc Is The Successor Video Coding Standard To H.264/Mpeg-4 [12] Avc (Advanced Video Coding) And The Main Feature Of The Hevc [2] (V Sullivan Et Al. 2012) Video Coding Standard Is To Maintains The Same Level Of The Video Quality While Increasing The Data Compression Ratio Else Increasing In Video Quality At The Same Data Compression Ratio. The Hevc Video Coding [3] Makes A Tradeoff Between The Video Compression Efficiency, Coding Complexity And The Coding Time Delay. The Hevc Supports Resolution Up To 8k [9] (4k In H.264) And Reducing The Bit Rate By 40-50% [10] Compared To H.264 With The Same Video Quality. The H.265 Achieves This Feature By Changing The Core Of The Coding Layer From Macro Block With Fixed Size To The Coding Tree Unit (Ctu) With Flexible Larger Size. The Hevc Has Multiple Profiles Or Levels To Support Various Ranges Of The Applications That Have Different Capabilities.

Dct:

Discrete Cosine Transform (Dct) [14] Is Widely Used In Digital Image Processing, Especially For Video Compression. Few Of The Applications Of 2d Dct Involve Still Image Compression And Compression Of Individual Video Frames, While Multidimensional Dct Is Often Used For Compression Of Video Streams. Dct Is Also Useful For Transferring Multidimensional Data To Frequency Domain, Where Different Operations, Like Spread Spectrum, Data Compression, Video Compression, Can Be Performed In Simple With Less Effort And More Efficient Manner. The Dct Is A Widely Used Transformation Technique For Video/Data Compression. It Is An Orthogonal Transformation, Which Has A Fixed Set Of (Image Independent) Basis Functions, An Efficient Algorithm For Computation, And Well Energy Compaction And

Correlation Reduction Properties. They Become Identical As The Correlation Between The Adjacent Pixel Approaches To One.

Dwt:

The Wavelet Transform (Wt) Has Gained Widespread Acceptance Across The World In Signal Processing And Image Compression. Because Of Their Inherent Multi-Resolution Nature, Wavelet-Coding Schemes Are Especially Suitable For Applications Where Scalability And Tolerable Degradation Are Important. Basically Wavelets Are The Functions Defined Over A Finite Interval And Having An Average Value Of Zero. The Basic Idea Of The Wavelet Transform Is To Represent Any Arbitrary Function (T) As A Superposition Of A Set Of Such Wavelets Or Basis Functions. These Basis Functions Or Baby Wavelets Are Obtained From A Single Prototype Wavelet Called The Mother Wavelet, By Dilations Or Contractions (Scaling) And Translations (Shifts). The Discrete Wavelet Transform Of A Finite Length Signal X(N) Having N Components, For Example, Is Expressed By An N X N Matrix.

THE HEVC VIDEO CODING STRUCTURE

H.265/Hevc Is Based On The H.264 Video Standard And Borrows Much Of Its Technology While It Has Also Developed Few Concepts Which Are Different From Its Predecessor H.264. Some Features[8] Such As Cabac Entropy Coding , Wave Front Processing, Tree Recursion Supported, Full Prediction And Transformation Quad, Adaptive Sop, Weighted Prediction For P Slices, Multiple Reference Frames, Constant Quantizer, Single Pass Abr, Scene Cut Detection And Rate Control, Optional Ubv, Constant Quality Etc. When I Survey Various Video Standard Codec's , I Found That Majority Of The Codec's Have Used Similar Kind Of Transformation Technique Listed In Below Table 1.

Table 1: Transformations Used In Various Video Codec's.

Standard	**Mpeg-1**	**Mpeg-2**	**Mpeg-4**	**H.261**	**H.263**	**H.264/Avc**	**H.265**
Transformation	8×8 Dct	8×8 Dct	8×8 Dct	8×8 Dct	8×8 Dct	4×4 Dct	8×8 Dct

As Per The Above Table I Found That Dct Is One Common Transformation Technique Have Been Used Since Mpeg-1 To H.265 And The Recent One Hevc Is Also Used The Same Transformation Technique Which Makes Occupying A Less Storage Area For Video Data, Though Even I Found Some Limitations With This.

Limitations Of Dct:

Basically Dct Works Well For Simple And Average Compression But That Is Not Much Efficient For High Compression Because Generally Dct Is Used To Compress Individual Blocks, When The Compression Is High It Generates Blocking Artifacts Since The Jpeg Standard Suffers Heavily From This At Higher Compressions Blocking Artifacts Is A Distortion That Appears When The Higher Compression Takes Place And Appears As Abnormally Large Pixel Blocks. Dct And Dwt Both Are The Different Technologies Which Working Frequency Based. I Agree That Dwt Gives Better Compression Ratio Without Losing More Information Of The Image At The Same Time It Takes More Processing Power, While In Dct Takes Low Processing Power But It Has Blocking Artifacts And This Can Be Resolved By Using Dwt.

II. PROPOSED HEVC HYBRID TRANSFORMATION

The Hevc Video Coding Standard Uses The Concept Of Hybrid (Dct And Dwt) Transformation To Overcome The Disadvantages In The Existing Architecture.

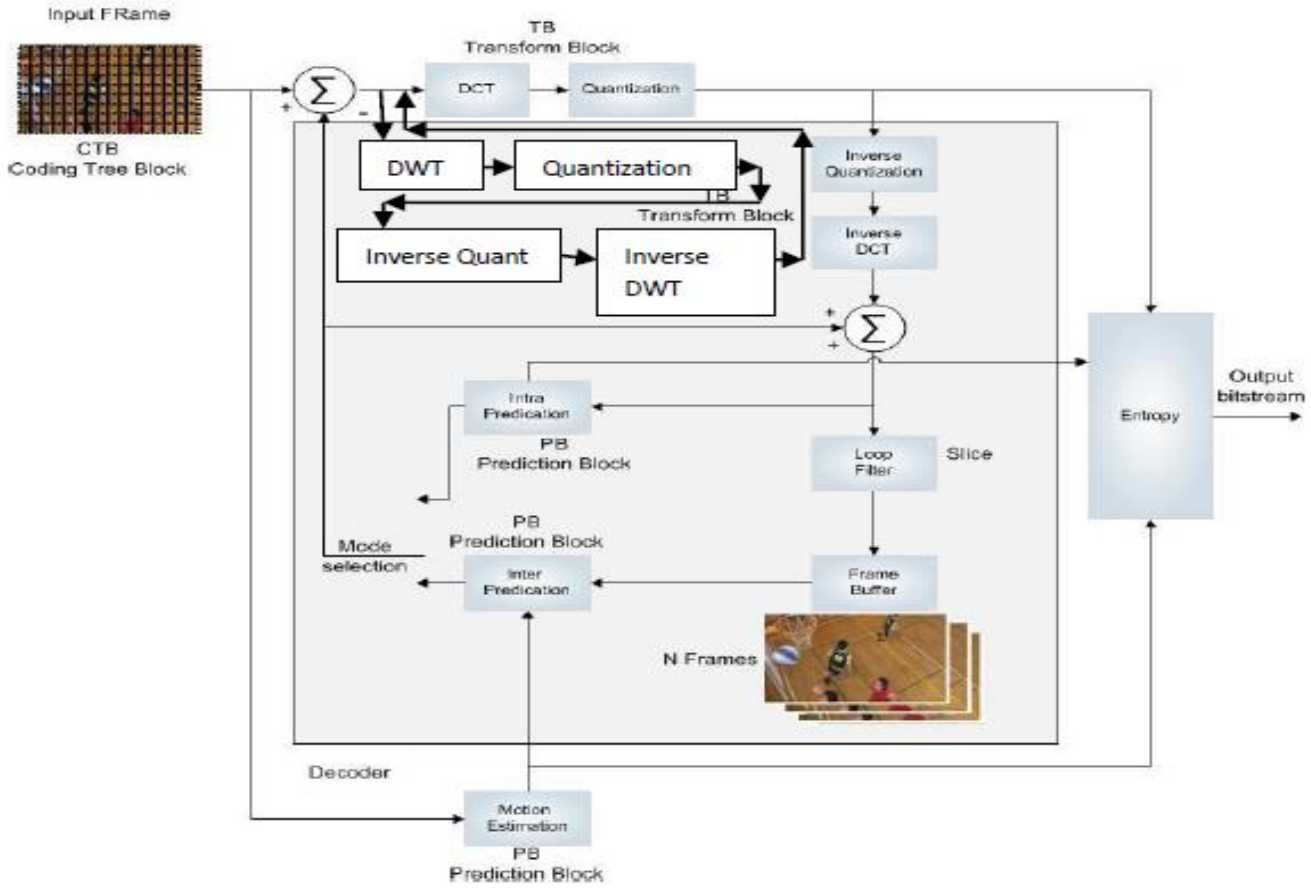

Fig1: Transmogrify Hevc Using Hybrid Transformation (Modified Hevc)

Hybrid Transformation Means It Uses The Both Different Techniques Dct And Dwt And Performing One After The Other. Figure 1 Shows The Encoding And Decoding Block Diagram With Hybrid Transformation For The Hevc As A Hybrid Video Coding Standard [4-5] (Madhukar Et Al., 2014). In The Hevc, The Input Video Is Broken Into A Sequence Of Pictures Or Frames, Each Picture / Frame Is Divided Into Blocks And Then Each Block Is Predicted By Using Either Intra Prediction Or Inter Prediction[6-7] (Bossen, Misra Et Al., 2012,2013).

The Intra Prediction Eliminates The Spatial Redundancy Between Neighboring Blocks Inside A Picture Or Frame And The Inter Prediction Eliminates The Temporal Redundancy Between Pictures Or Frames. The Subtraction Between The Original Block That We Taken And The Predicted Block We Obtained Should Forms The Prediction Error That Is Defined As The Residual. The Prediction Error (Residual) Is Transformed From The Spatial Domain To The Frequency Domain Using Powerful Transformation Techniques Dwt Discrete Wavelet Transform Then The Dwt Coefficients Is Quantized And Transferred To A Other Technique Discrete Cosine Transform (Dct) After That Dct Coefficients Is Quantized And Coded With The Prediction Information By The Entropy Process.

The Hybrid Dwt Dct [11] (Singh Et Al., 2007) Work Well And Exploits The Key Features Of Both Dct And Dwt Techniques And Provides A Better Compression. The Below Fig 2: Shows The Working Of Dwt And Dct In Hybrid Manner.

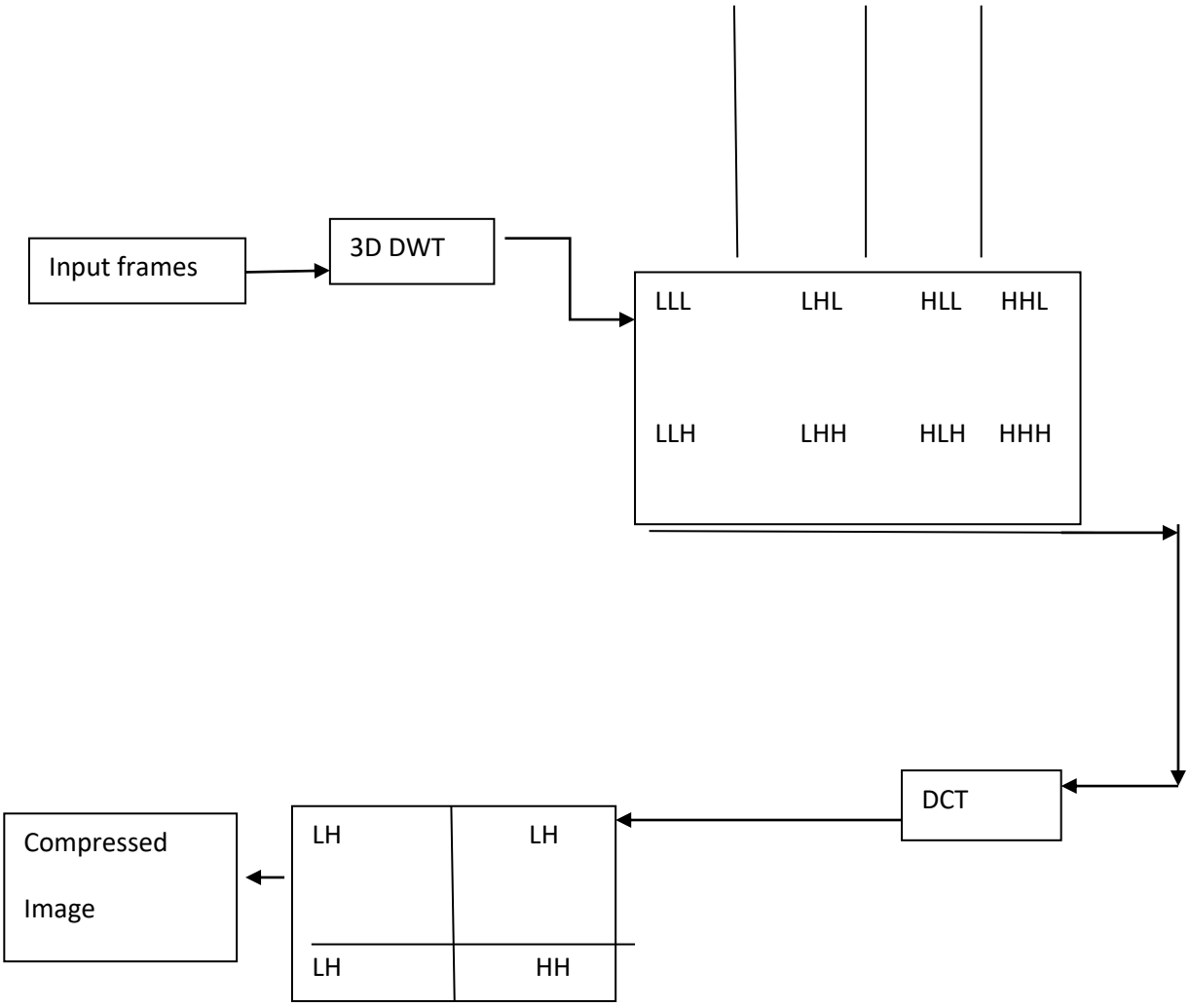

Fig 2: Dwt And Dct In Hybrid Manner

Conclusion

When I Gone Through H.265/Hevc Architecture, I Have Found That Dct And Dst Has Been Used As Transformation Technique. However Dct Having Their Own Limitations And These Limitations Can Be Overcome By Using Other Technique Dwt. So Dct And Dwt Both Techniques Having Pros And Cons And Are Suitable To Some Specific Applications. We Should Appreciate It And Enchase The Benefits Available From Both Techniques And We Will Work Together Dct And Dwt As A Hybrid Transformation And Apply To Hevc And This Transmogrified Hevc Definitely Will Give Better Result Than Old. But Hybrid Cause More Computational Complex So We Will Look In To Serious In Future.

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