Generating Intermediate Representation (IR) .txt format from DFG IR

We take the example of **8Point DCT** to explain the IR file creation process from its DFG IR. The generic function (high-level code) of 8-Point DCT to compute a sample o/p is [1][2][3]:

X[0]=k1*x[0]+ k2*x[1]+ k3*x[2]+ k4*x[3]+ k5*x[4]+ k6*x[5]+ k7*x[6]+ k8*x[7]

The respective DFG is shown below [1][2][3]:

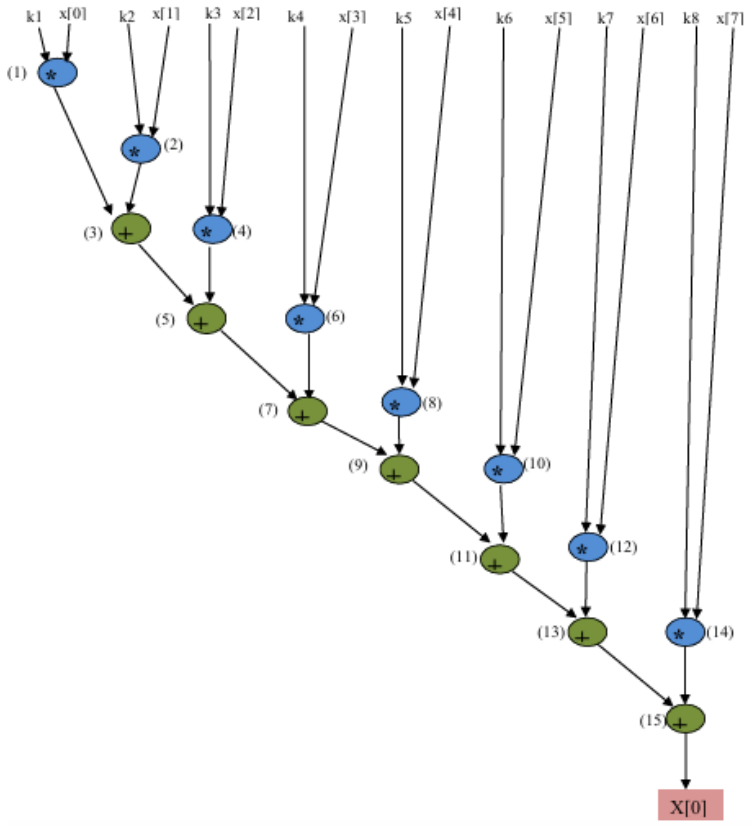
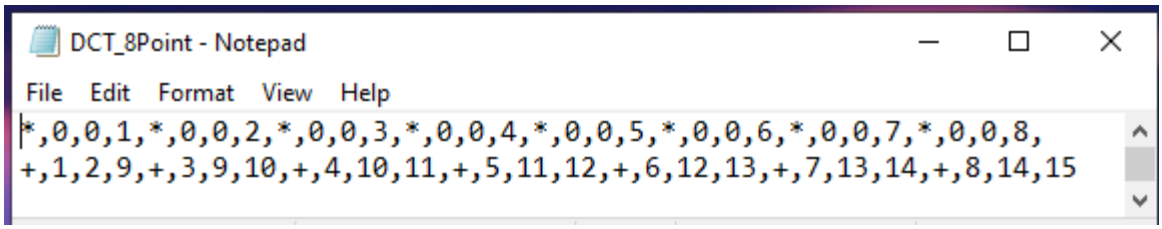


Fig. Data flow graph of an 8-point DCT

The respective .txt file format for the above DFG IR is shown below:



Similarly, other DFG IRs have been converted into its respective .txt file format (IR).

The HLS Benchmarks in the form of high-level description (transfer function) and it associated intermediate representation (IR) as CDFG/DFG is provided in the "HLS Benchmarks.pdf", also publicly available in:

https://www.anirban-sengupta.com/HLS%20Benchmarks%20Details.pdf

The IR in the form of text file format (such as DCT_8Point.txt, FIR.txt etc) is generated from the DFG above.

Note: The relevant research paper citations, where the high-level description (transfer function) and it associated intermediate representation (IR) as CDFG/DFG is described, is also present in the PDF file.

References:

[1] A. Sengupta, R. Chaurasia and A. Anshul, "Robust Security of Hardware Accelerators Using Protein Molecular Biometric Signature and Facial Biometric Encryption Key," **IEEE Transactions on Very Large Scale Integration (VLSI) Systems**, vol. 31, no. 6, pp. 826-839, June 2023, doi: 10.1109/TVLSI.2023.3265559.

[2] A. Sengupta "High-Level Synthesis based Methodologies for Hardware Security, Trust and IP Protection, " **The Institute of Engineering and Technology (IET)**, 2024, ISBN-13: 978-1-83724 117-0.

[3] A. Sengupta, S. P. Mohanty "IP Core Protection and Hardware-Assisted Security for Consumer Electronics", **The Institute of Engineering and Technology (IET)**, 2019, Book ISBN: 978-1-78561-799-7, e-ISBN: 978-1-78561-800-0.