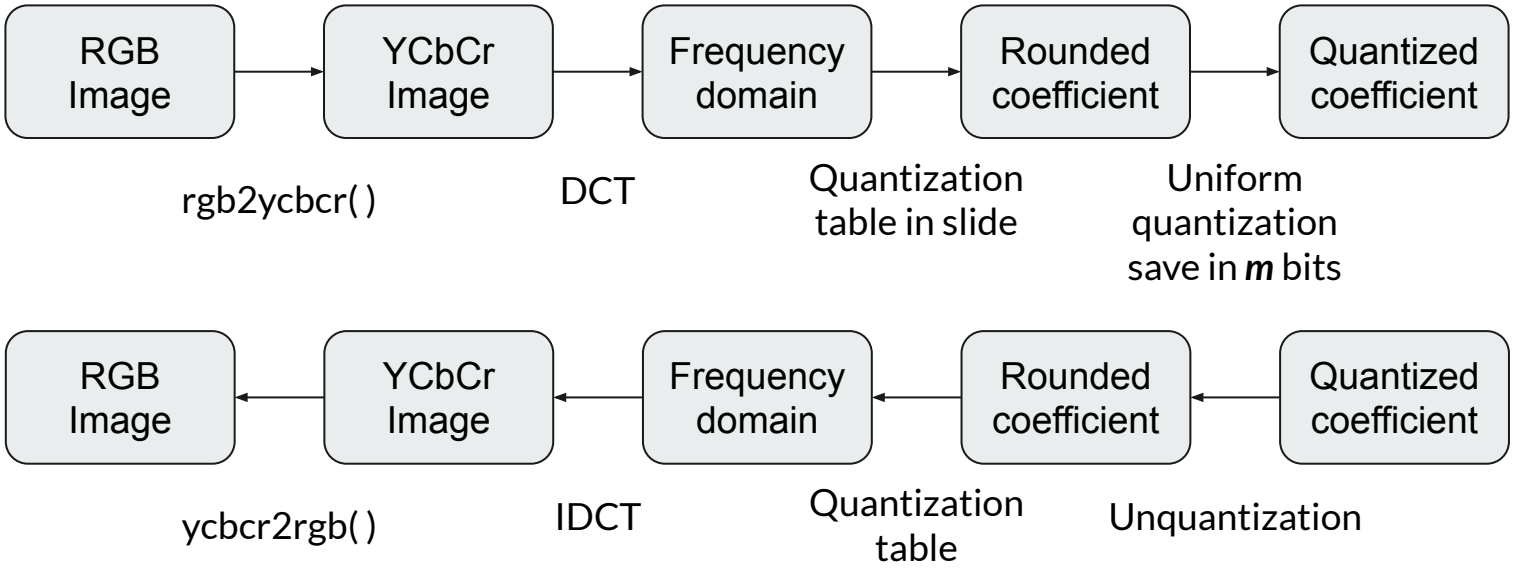
Homework 2

1. DCT Image Compression

- Implement simplified DCT compression

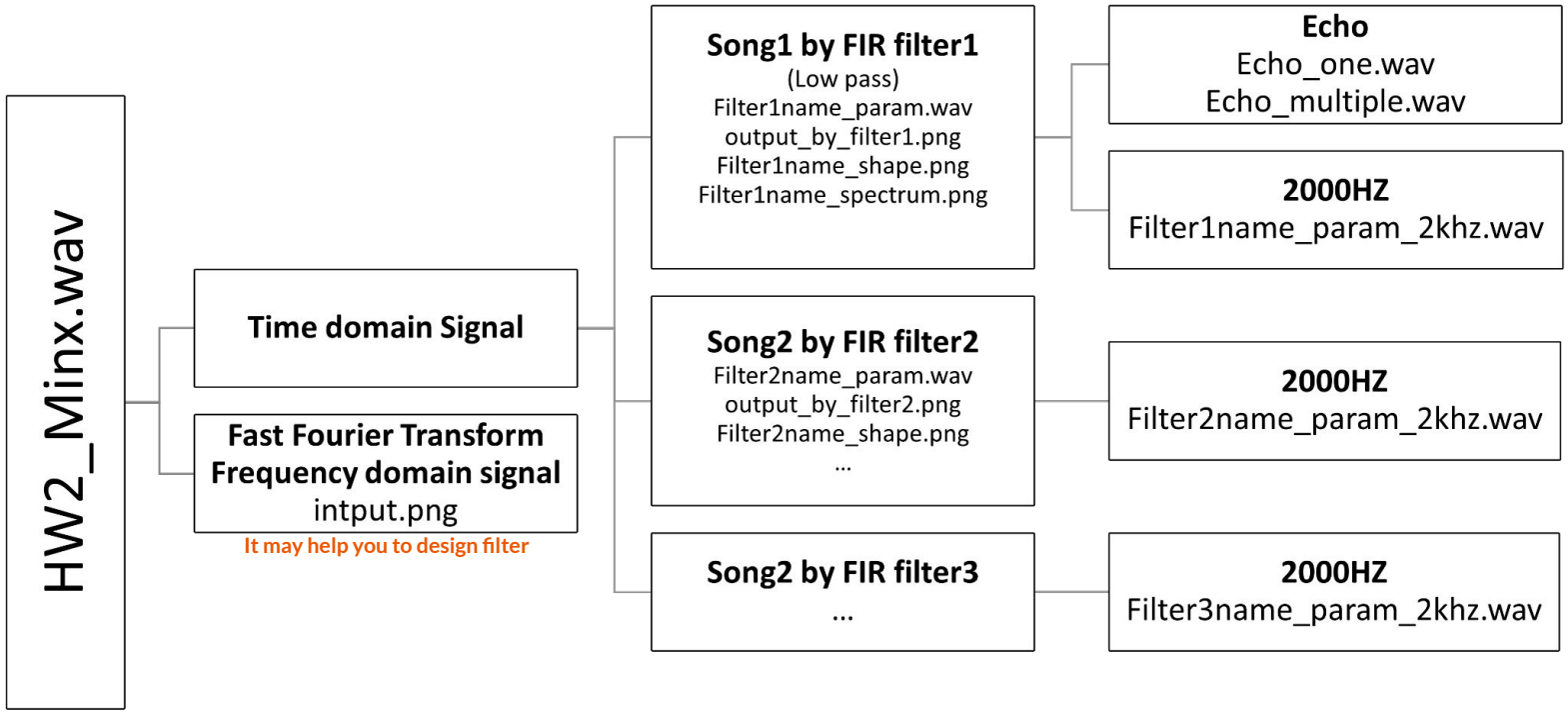


1. DCT Image Compression

- Report
  - Discuss the compression quality with different setting and quantitative result(compression ratio, PSNR)
  - Discuss the difference between 2 input images

- Output image
  - 2 input image
  - each has 8 output images, 16 images in total

2. Create your own FIR filters to filter audio signal



Output

- File
  - 10 images
  - 8 audios
  - please follow the file name rule at HW2.pdf (newest version)
  -
- Report
  - Discuss how you determine the filters.
  - How you implement the filter and convolutions to separate the mixed song and one/multiple fold echo?
  - Compare spectrum and shape of the filters.
  - Briefly compare the difference between signals before and after reducing the sampling rates.

Reference

- **Course Material:**

  1.FFT transform : Unit4 p.24~p.25

  2.FIR filter design : Unit4 p.72~p.76

  3.Echo : Unit4 p.65

- **The package we can use:**

  numpy、*scipy.io.wavfile* 、*numpy.fft* 、*numpy.fft.fftfreq*、*matplotlib.pyplot*

- Note

  1.You can directly use *numpy.fft* and *numpy.fft.fftfreq* to do fft.

  2.Other implementation such as: *filter design*、*convolution1D* 、*echo*、*down sample rate* should implement by yourself.