CT Scan / Radon Project

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Summary

The Radon transform computes the integral along rays through an image. To implement this in a straightforward way, I rotated the image through different angles and summed along columns. For back-projecting the Radon transform sinogram, I added the values of each radon transform to a blank image cumulatively, rotating the image each time. Simple back-projection caused a blurred image. Filtering the image took out low frequencies but left a dark image.

The Radon transform simulates a CT Scan by simulating the parallel x-rays passing through a phantom. In testing my own implementation of the Radon transform and back-projections, I found that one must include angles ranging from 0° to 180° and that more angle gives a better back-projection image. Another finding is that the filter before back-projection is important to take out blurring by simple-backprojections.

Implementation Details

Motivation

Being a single person group, I thought that an interesting project would be to try to implement the Radon and inverse Radon transforms without using the built-in functions of Matlab or python. Dr Tsekos sent me an example of someone doing the radon transform without using the built-in radon in Matlab (Nguyen). I decided to use python instead of Matlab because I have used python in other classes.

References

http://biomedicalsignalandimage.blogspot.com/2016/02/matlab-code-to-perform-tomographic.html