Image Processing Project 3

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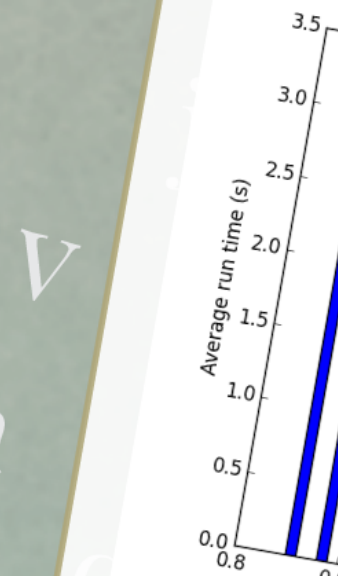
Task 3.1

Implement a recursive filter for Gaussian Image Smoothing (In Python)

- Convolving is separable operation
- Considering only 1-D will be sufficient

Approach :

- Compute Coefficients for causal and anti causal filter
- Convolve in X direction
  - Compute causal and anti causal filter
  - Compute 1D filter - $y[n] = \frac{1}{\sigma\sqrt{2\pi}}(y^{+}[n] + y^{-}[n])$
- Convolve in Y direction - Same as step 2



Output

Input Image

Sigma 0.94

Sigma 1.0

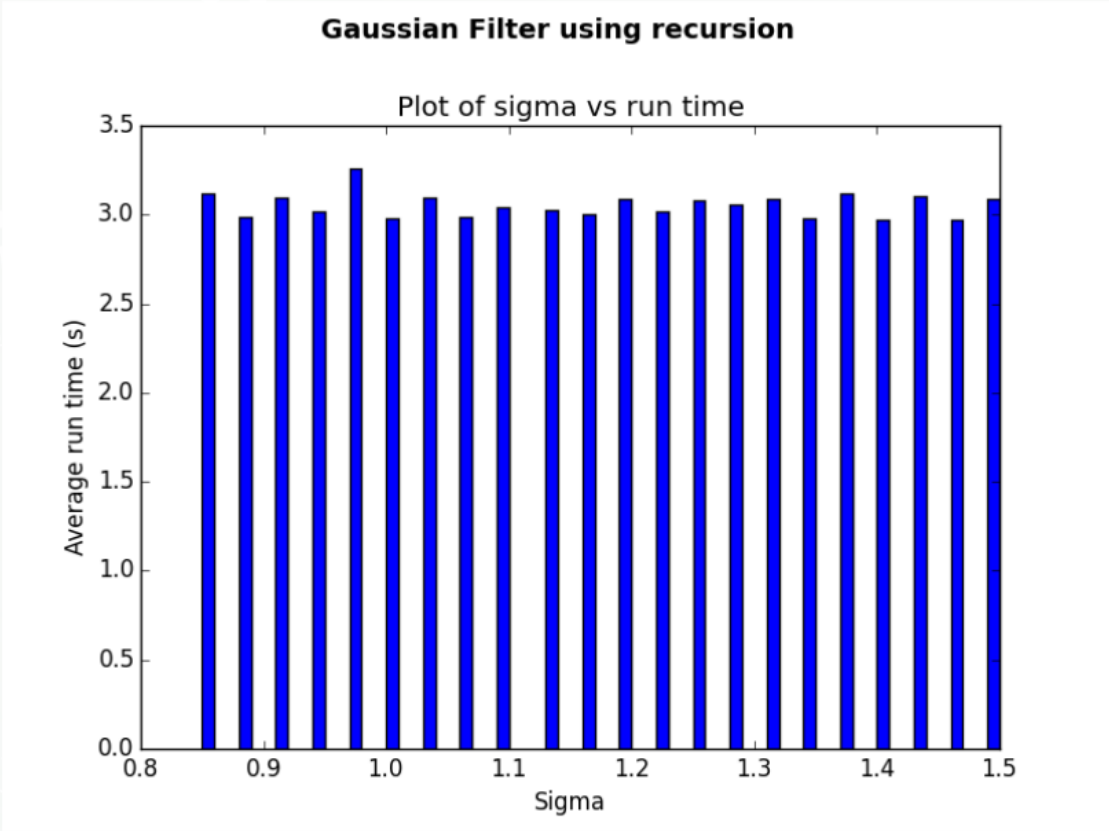
Output

Input Image

Sigma 0.88

Sigma 1.0

Observations & Outputs



Task 3.2

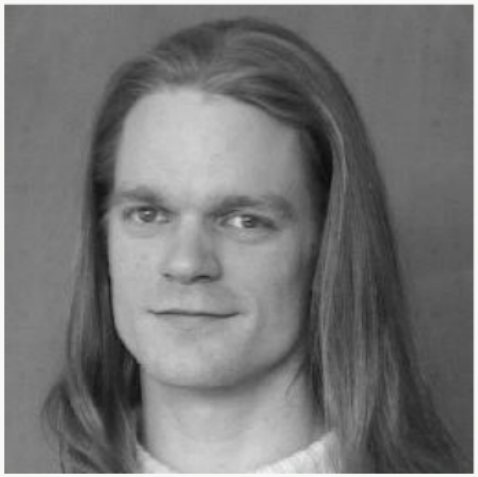
Implement a program to produce warp images

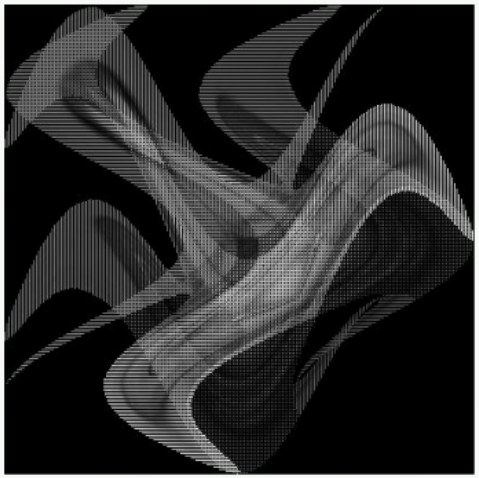
Approach

- Using simple warp methods
- Changed Y-coordinates as per a sin wave

$$T(x) = x + \alpha \sin(\nu x - \phi)$$

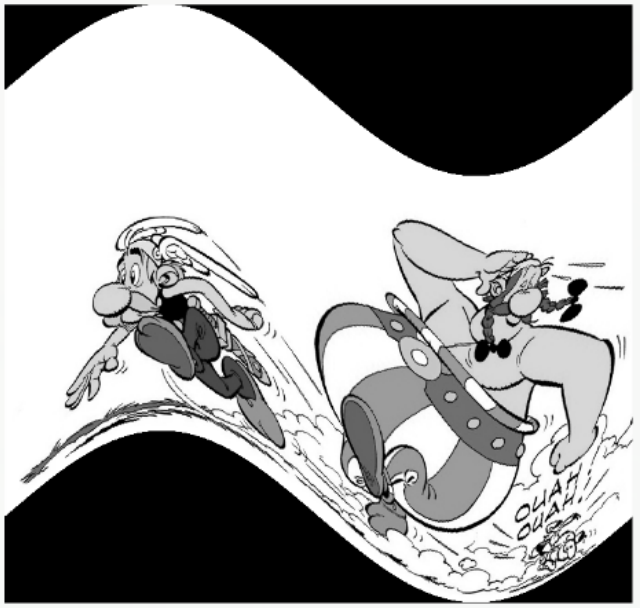
First Attempt





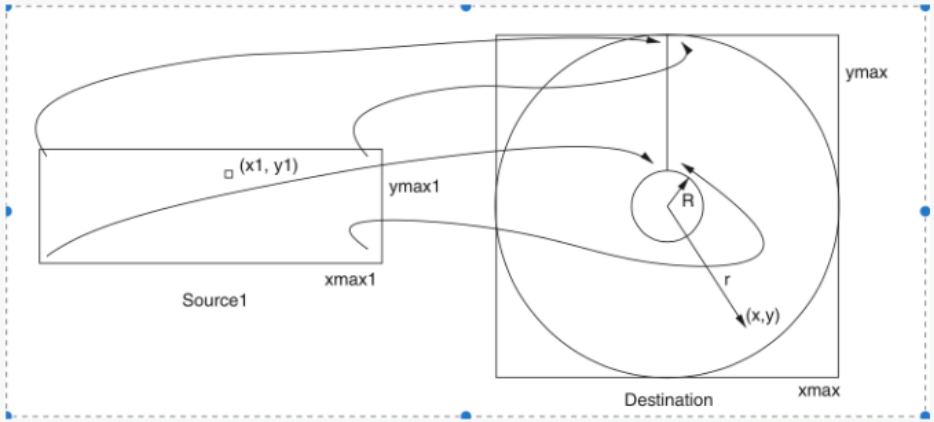
Output

Output



Task 3.3

Implementing Cylindrical Anamorphosis

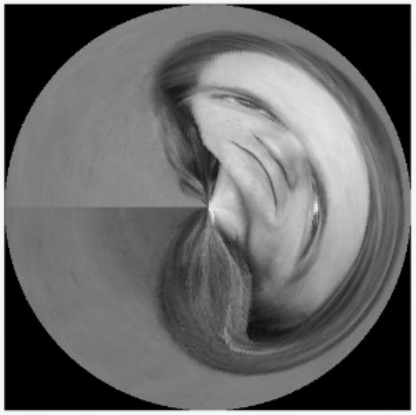


- Map Cartesian coordinates to Polar
- Copy intensity values
- Use pull warping

Picture from "An Interdisciplinary Introduction to Image Processing" by Steven L. Tanimoto

Output

Disk:



Output

Torus :

Output

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