

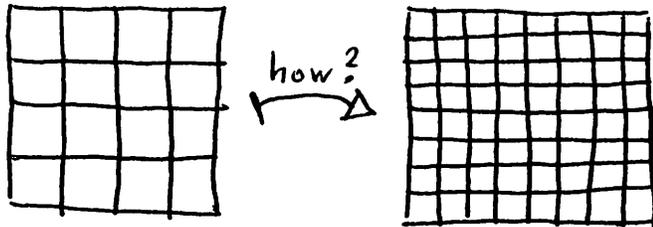
RECONSTRUCTION - Con't.

"More Thoughts, Issues, Ideas"

1) From given sinogram to higher-resolution sinogram?

orig. sinogram

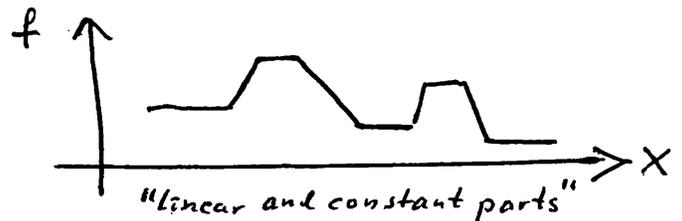
higher-res
sinogram



→ Meaningful construction of the higher-res sinogram:

- analyze rows of orig. sinogram and identify "stretches" of near-constant or near-linear behavior;
- use these stretches / intervals to define a BLaC (= blending of linear and constant) function that, as much as possible, approximates the behavior in a row of the original sinogram;
- evaluate the BLaC function (per row) on a higher-res. grid;
- use the higher-res. sinogram to define more conditions for the reconstruction process;

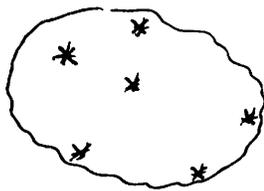
- Ex: BLaC
function f



RECONSTRUCTION - Cont'd.

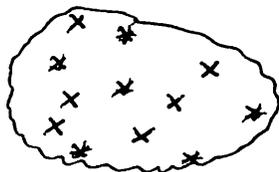
2) Iterative refinement for radial basis function reconstr.

→ Represent 3D volume image with 'more and more' radial basis functions (RBFs) where necessary;



6 RBFs

↓ refine



12 RBFs

- use initial set of RBFs;

- reconstruct;

- refine set of RBFs;

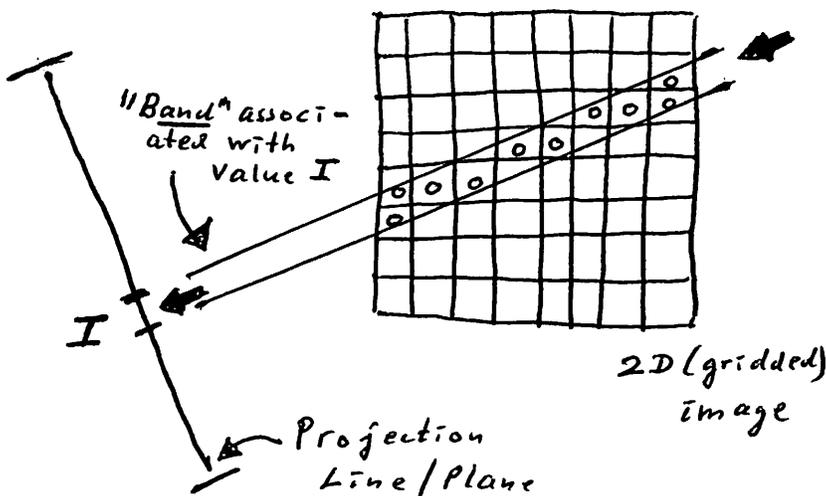
- reconstruct again;

- "refine until no more change";

3) BRESENHAM'S Line Drawing algorithm - Useful?

→ Need to generalize from 2D (pixels) to 3D (voxels):

2D case:



- determine where the "band" enters and exits image;

- determine set of pixels/voxels inside band: \square ;

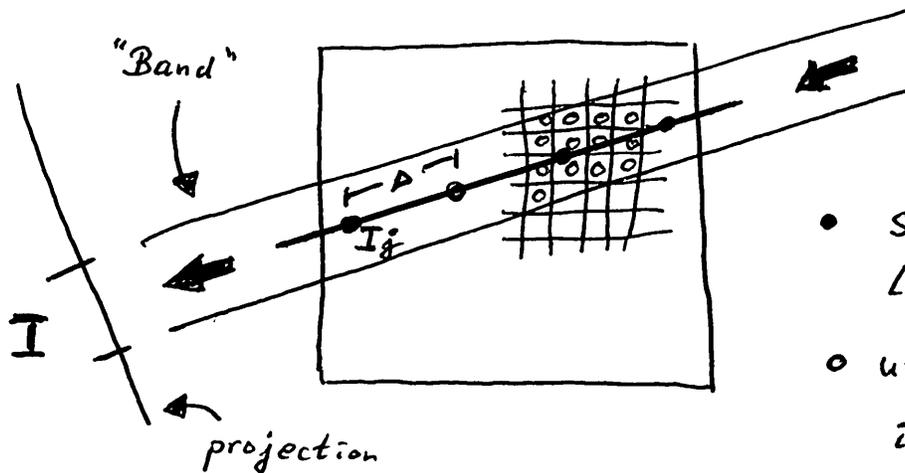
- I-values given in projection \Rightarrow unknown

\square -values can be computed;

RECONSTRUCTION - Cont'd.

4) "Ray bands" passing through the 2D/3D image

2D case:



- sample location on ray
- unknown 2D/3D image value i_k

$\rightarrow I = \sum \Delta I_j$

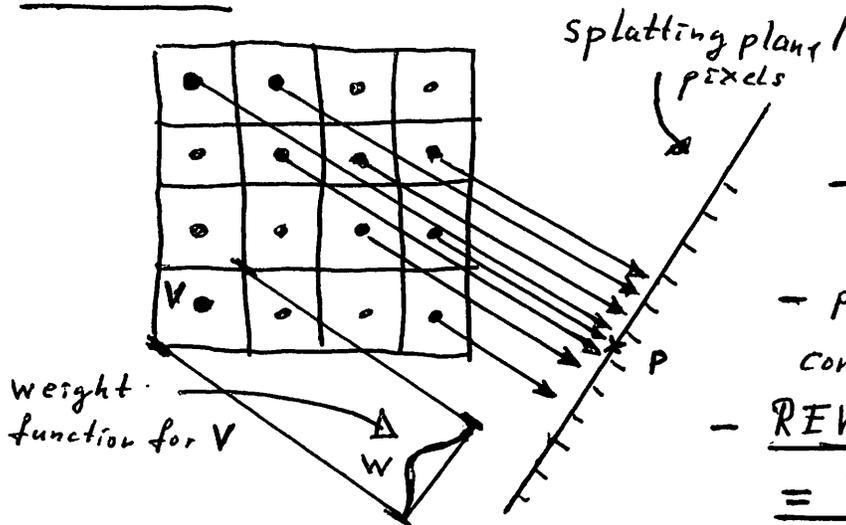
\rightarrow express I_j in terms of 'local'

i_k -values: $I_j = \sum_{\text{local}} w_k \cdot i_k$

using weights/weight functions w_k .

5) "Reverse-Splatting" based on Lee Westover's dissertation

2D case:



Standard:

- image value V has associated weight w_i
- splats ordered relative to distance to splatting plane;
- pixel value p obtained by combining/integrating V -values;
- REVERSE SPLATTING
- = RECONSTRUCTION ^{BH}