

Reconstruction in CT: Hints for the assignments

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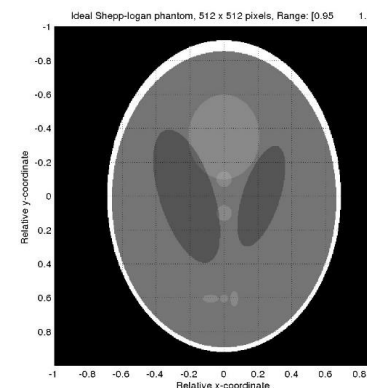
$$f(x+\Delta x) = \sum_{n=0}^{\infty} \frac{(\Delta x)^n}{n!} f^{(n)}(x) = (2.718281828)^{\Delta x} f(x)$$

DTU Health Technology



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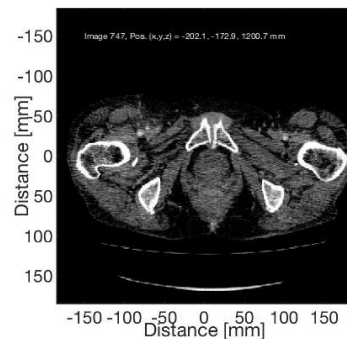
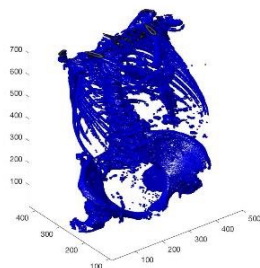
Shepp-Logan phantom



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Assignment data

- DICOM data from female patient
- All data available on the web
- Task is to find which slice it is



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Reading DICOM data 1

```
% Set overall parameters
dir_name='DICOM/ST00001/SE00001/'; % Directory name
start_image=1; % First image in series
end_image=747; % Last image in series
frame_rate=50; % Frame rate for playing back the movie

% Set the dynamic range for the display
off_set=100; % Offset [Hu]
range=400; % Range to display [Hu]
map_values=128; % Number of gray level values
bone_off_set= -250; % Offset for showing the bones
bone_range=100; % Range for showing the bones

% Initialize figure
colormap(gray(map_values));
dicom_movie(end_image+1-start_image) = struct('cdata',[],'colormap',[]);
```



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Reading DICOM data 2



```
Read information for the first images
file_name='IM0001';
info=dicominfo([dir_name, file_name]);
dx=info.PixelSpacing(1);
dy=info.PixelSpacing(2);
Y = dicomread(info);
[Nx,Ny]=size(Y);

% Make space for all the images
Y=zeros(Nx,Ny,end_image+1-start_image);
z_positions=zeros(end_image+1-start_image,1);
```

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```
% Loop through the images and read and display them
for i=start_image:end_image
    file_name=[ 'IM00',num2str(floor(i/100)),num2str(floor(rem(i,100)/10)),num2str(rem(i,10))];
    info=dicominfo([dir_name, file_name]);
    Y(:, :, i) = dicomread(info);
    image((1:Nx)-Nx/2)*dx, ((1:Ny)-Ny/2)*dy, (double(Y(:, :, i))+off_set)/range*map_values)
    xlabel('Distance [mm]')
    ylabel('Distance [mm]')
    pos=sprintf('%5.1f, %5.1f, %5.1f', info.ImagePositionPatient(1), ...
        info.ImagePositionPatient(2), info.ImagePositionPatient(3));
    z_positions(i)= info.ImagePositionPatient(3);
    text(-150, -150, ['Image ', num2str(i), ', Pos. (x,y,z) = ', pos, ' mm'], 'Color', [1 1 1])
    axis('image')
    drawnow
    dicom_movie(i)=getframe;
end

% Display the movie
movie(dicom_movie, 5, frame_rate);
```

Script in: ct_data/dicom_data

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Full script can be found at:

https://courses.healthtech.dtu.dk/22485/files/ct_data/dicom_data/display_dicom_images.m

on the page for the CT data: https://courses.healthtech.dtu.dk/22485/?ct_data/assign_data.html

7/x

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