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%This program will take a CBCT image set exported from the SARRP and scale
%it by an appropriate factor in order to allow Velocity to properly handle
%the data for deformable registration. This is necessary due to the
%difference in saturation values between the SARRP CBCT data and
%conventional CBCT image data based on CT number.

%Prompting user for original CBCT image folder and destination for
%transformed CBCT images
sourceFolder = uigetdir('A:\Fred Stuff\',' Please select source image folder ');
if ~isdir(sourceFolder)
  errorMessage = sprintf('Error: The following folder does not exist:\n%s',↙
sourceFolder);
  uiwait(warndlg(errorMessage));
  return;
end

destinationFolder = uigetdir('A:\Fred Stuff\',' Please select tranformation folder ');
if ~isdir(destinationFolder)
  errorMessage = sprintf('Error: The following folder does not exist:\n%s',↙
destinationFolder);
  uiwait(warndlg(errorMessage));
  return;
end

%Searching for dicom formatted image slices
filePattern = fullfile(sourceFolder, '*.dcm');
dcmFiles = dir(filePattern);

%Creating arrays needed for handling full CBCT image data set
startArray = dicomread(fullfile(sourceFolder,dcmFiles(1).name));
startArraySize = size(startArray);
imageArray = zeros(startArraySize(1), startArraySize(2));

%For loop interations dependent on number of CBCT slices. This loop will
%transform each image slice by a scalar and save it as a dicom in the
%designated destination folder
for k = 1:length(dcmFiles)
  %For each iteration, the next image slice is acquired and added to the
  %array.
  baseFileName = dcmFiles(k).name;
  fullFileName = fullfile(sourceFolder, baseFileName);
  destFileName = fullfile(destinationFolder, baseFileName);
  fprintf(1, 'Now reading %s\n', fullFileName);
  imageArray(:,:) = dicomread(fullFileName);

  %For each iteration, the header file is acquired to be copied to the new
  %transformed image slice dicom
  infoGrab = fullfile(sourceFolder,dcmFiles(k).name);
  info=dicominfo(infoGrab);
  info.SeriesNumber=2;

  %Each image slice is transformed by a scalar, in this case a factor of
  %10. This can be tailored to the specific needs of the user. In this
  %case, the SARRP CBCT data has a maximum value of ~30000 while the max
  %value handled by Velocity is based on CT number, which stops at 3000.
  imageArrayTranform=imageArray/10;
```

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55
56   %New image array must be converted to a unsigned integer 16 bit to match
57   %data formatting on the SARRP
58   imageArrayU=uint16(imageArrayTranform);
59   arraySize2=size(imageArrayU);
60
61   %Final transformed slice is written as a dicom to the designated
62   %destination folder
63   dicomwrite(reshape(imageArrayU,[arraySize2(1) arraySize2(2) 1]), destFileName,info,↙
'CreateMode', 'Copy');
64
65   %Clear memory for next iteration
66   clear infoGrab;
67   clear info;
68   clear imageArrayTransform;
69   clear imageArrayU;
70   clear arraySize2;
71 end
```