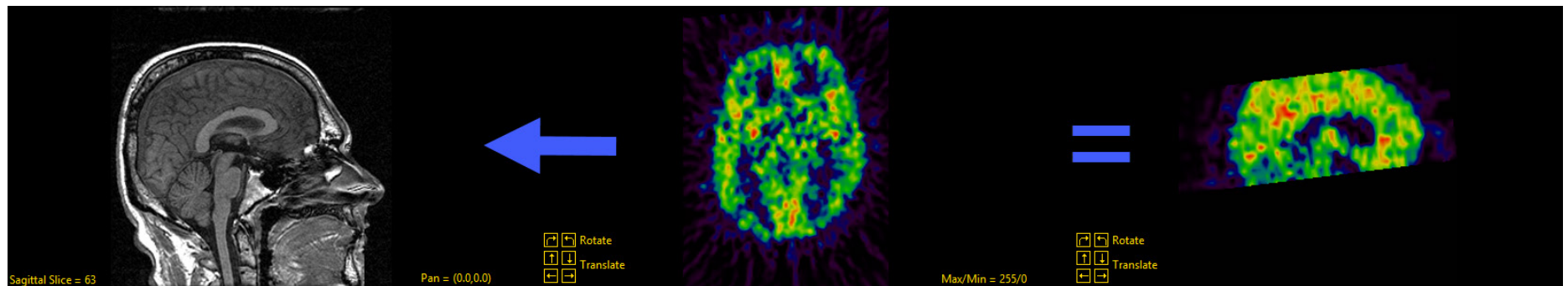


Introduction

Image Registration

The goal of image registration is to determine a spatial transformation that will bring into alignment separately acquired images of the same object. When accurately registered, each separate image will have the same coordinate system and same voxel size, a voxel in one image will represent the same physical location as the corresponding voxel in the other image. The registration process interpolates the registered images as they are resampled and/or reformatted during the registration process. For example, registration of an axial PET data set to a sagittal MRI data set results in the PET data being transformed (resampled and reformatted) into the sagittal MRI space.

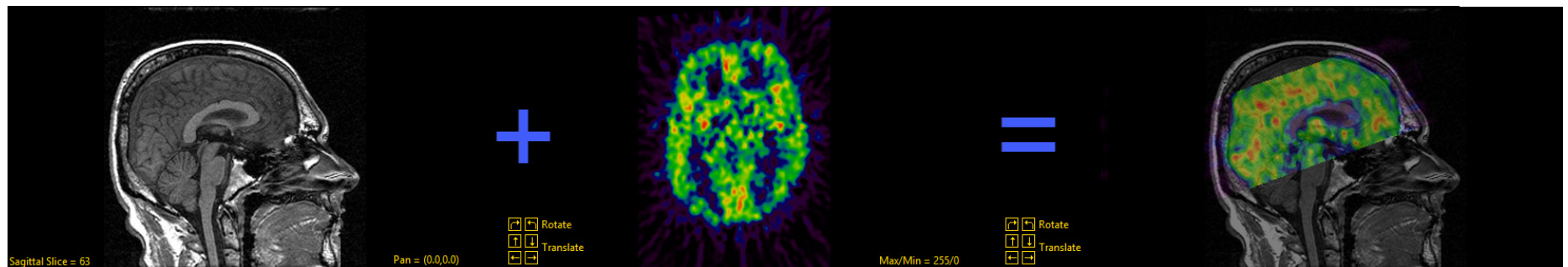


Registration is a prerequisite for several applications including; the display, segmentation, and analysis of structural and functional data, algebraic manipulation of image data (image addition, subtraction, multiplication, and division), the analysis of dynamic image data, and the fusion of data from multiple images.

Introduction (continued)

Image Fusion

Image fusion is the process of combining, into one image, the information from multiple registered images. For example, the registration of an axial PET to a sagittal MRI allows for the transformed PET image data to be superimposed upon the sagittal MRI and output as a single fused volume illustrating both structure and function.



Transformation

Transformation is the process of changing a match data set to align with the base data set using the parameters calculated during registration, these parameters include; translation, rotation, scaling, and shear.

Translation: A translation moves data to a different position. A 2D image can be moved left, right, up or down. A 3D volume can be moved left, right, up, down, backwards or forwards.

Rotation: Rotation rotates the data at a particular angle from its origin.

Scaling: Scaling changes the size of a data set. Scaling either expands or compresses the dimensions of the image data.

Shear: Shearing, sometimes referred to as skewing, is a transformation that slants the shape of the data.