CLAIMS

What is claimed is:

1. A system for analyzing and/or registering at least one unregistered medical image, the system comprising:

a deep learning model generating a three-dimensional (3D) transformation matrix for an unregistered medical image provided as an input, the 3D transformation matrix being generated based on trained machine learning logic of the deep learning model,

wherein the 3D transformation matrix includes parameters that rotate and/or translate points in the unregistered medical image into a registered orientation.

2. The system of claim 1, further comprising:

an interpolation component configured to:

receive the 3D transformation matrix from the deep learning model;

receive the unregistered medical image; and

apply the 3D transformation matrix in three dimensions to rotate and/or translate points of the unregistered medical image in space to generate a registered medical image corresponding to the unregistered medical image.

3. The system of claim 2, wherein the deep learning model is configured to generate six predictions for the 3D transformation matrix, the six predictions comprising:

rotations of the points of the unregistered medical image in each of three dimensions; and

translations of the points of the unregistered medical image in each of the three dimensions.

4. The system of claim 2 or 3, wherein the 3D transformation matrix is a 4x4 matrix.

5. The system of claim 2, 3 or 4, wherein the 3D transformation matrix is a rigid transform that includes a first set of parameters and a second set of parameters for the unregistered medical image, wherein the first set of parameters define a rotation of the unregistered

medical image and the second set of parameters define a translation of the unregistered medical image.

6. The system of any one of claims 2 to 5, further comprising:

a test component that performs a mutual information test comparing the medical image registered in three-dimensional space to a template image, wherein the test component outputs a result of the mutual information test,

wherein, if the result is below a threshold, the medical image registered in three-dimensional space is rejected or flagged.

7. The system of any one of claims 2 to 6, wherein the unregistered medical image is a three-dimensional volume of pixels, and wherein the 3D transformation matrix is calculated for the unregistered medical image to map the unregistered medical image to real world coordinates for transformation by the interpolation component.

8. The system of any one of claims 2 to 7, further comprising:

a standardization component that receives the unregistered medical image and analyzes the unregistered medical image to validate criteria, the standardization component adjusting the unregistered medical image if the criteria are not met,

wherein the unregistered medical image is a raw image before processing by the standardization component, and

wherein a standardized raw image is input to the interpolation component,

and optionally, the standardization component outputs the standardized raw image as the unregistered medical image to the deep learning model.

9. The system of claim 8, wherein only the standardized raw image or a raw image is input to the deep learning model, or wherein the standardized raw image and a template image are input to the deep learning model.

10. The system of any one of claims 2 to 9, wherein, after the trained machine learning logic is trained, learning from the unregistered medical image input to the deep learning model is disabled.

11. The system of any of the preceding claims, wherein the deep learning model includes at least two deep learning models, each of the at least two deep learning models being trained on different training data or each of the at least two deep learning models being weighted differently.

12. The system of any of the preceding claims, wherein the deep learning model is trained based on a data set of medical images that are manually aligned with a template image, wherein the template image is a specific medical image oriented at a reference position.

13. The system of any of the preceding claims, wherein the deep learning model is trained based on a data set of negative correlation data.

14. A method for registering at least one medical image, the method comprising:

receiving a raw medical image;

inputting the raw medical image into a deep learning model; and

generating a 3D transformation matrix for the raw medical image based on trained machine learning logic,

wherein the 3D transformation matrix includes rotation and/or shift parameters that rotate and/or translate points in the raw medical image into a registered orientation.

15. A non-transitory computer readable storage media comprising instructions that, when executed by at least one processor, cause the processor to execute a method of claim 14.