Medical Image Registration

MONAI offers the **Warp** module to do image registration tasks. This module is cooperatively developed by MONAI developers and DeepReg developers. Originally DeepReg library was in TensorFlow 2, but in MONAI it is ported to PyTorch. It is not known whether the transportation operation is done.

Some sources:

- https://www.youtube.com/watch?v=bVs6JUdrTYI
- https://medium.com/pytorch/monai-starts-to-explore-learning-based-medical-image-registration-ab6b143840b7
- https://deepreg.readthedocs.io/en/latest/tutorial/registration.html
- https://github.com/Project-MONAI/tutorials/blob/main/3d_registration/paired_lung_ct.ipynb

The image registration task involves steps similar to the deep learning since we are basically developing a deep learning model that predicts the affine matrix or DDF (density displacement field) or DVF (density velocity field).

```
model = LocalNet(
    spatial_dims=3,
    in_channels=2,
    out_channels=3,
    num_channel_initial=32,
    extract_levels=[3],
    out_activation=None,
    out_kernel_initializer="zeros",
).to(device)
warp_layer = Warp().to(device)
```