

# Automatic Non-rigid Histological Image Registration

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## Introduction

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This project is a challenge which is about Automatic Non-rigid Histological Image Registration (ANHIR). And this is a part of the IEEE International Symposium on Biomedical Imaging (ISBI) 2019.

Image registration is a image processing technique which can be used to align two or more images into a single scene. The visual comparison of successive tissue slices that align multiple images to a common frame is one of the simplest but the most useful features in digital pathology(<https://anhir.grand-challenge.org/Home/>). Image registration gives the possibility for pathologists to assess the histology and expression of multiple markers in a patient in a single region.

This project focuses on the registration accuracy and speed of the registration algorithm which automatically registers a set of large images from the same tissue samples but stained with different biomarkers.

## Dataset and ethical use of data:

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The Dataset is downloaded from [dataset webpage](#) which is offered by IEEE International Symposium on Biomedical Imaging (ISBI) 2019 contains a set of images and a landmarks files. More detailed information about the provider of each image can be found [Dataset Information](#). This dataset will be only used in this challenge and never be used in commercial. The dataset licence [CC-BY-NC-SA](#)

## Bibliography must be followed:

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- [Benchmarking of Image Registration Methods for Differently Stained Histological Slides](#) Borovec J, Munoz-Barrutia A, Kybic J.
- [independent segmentation of whole slide images: A case study in renal histology](#) Gupta L, Klinkhammer BM, Boor P, Merhof D, Gadermayr M. Stain
- [AIDPATH: Academia and Industry Collaboration for Digital Pathology](#) Bueno G., Deniz O.

## Evaluation:

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The evaluation function is based on the rTRE for each pair of landmarks in registered images pairs which is the competition criteria function. Detailed algorithm can be found in [Evaluation webpage](#).

## designed Solution:

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The designed solution is to use deep learning and ConvNets to solve the problem which is a kind of supervised learning. However, the unsupervised learning also can be used in Image Registration.

## Current state

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To get familiar with the ConvNets used in image processing, the top solution of the challenge [cat vs dog] on kaggle is being followed to learn the keras using and tensorflow using. The [code](#), [training result](#) and [training model](#) can be found in my [github page](#)