**Rotation invariant deep neural networks**

*Master’s Thesis/Project*

---

**Description:**
Deep convolutional neural networks (DCNN) have recently shown outstanding performance on image classification and object detection tasks due to their powerful multiscale filters. The dominant filters used in building DCNN architectures are only transitionally invariant, which is not optimal when the problem is rotation equivalent, as it is the case in e.g. cells detection and tracking task. Thus, by explicitly encoding the expected rotational invariance of the object in the image, the complexity of the problem is decreased, leading to a reduction in the size of the required model.

**Objective:**
- Perform literature review on rotation invariant filters.
- Implement rotation invariant filters.
- Train and test architectures with the new filters on cell detection and segmentation tasks.

**Qualification:**
- Experience in Python or C++
- Knowledgeable with TensorFlow
- Interested in machine learning and computer vision

**Literature:**
Marcos et al., *Rotation equivariant vector field networks*, ICCV, Venice, Italy, 2017

**Contact ICG:**
Darko Štern
stern@icg.tugraz.at

**Webpage:**
https://www.tugraz.at/institute/icg/research/team-bischof/medical-imaging-biometrics/