

## **A multi-type object classifier for astronomical imaging surveys using Convolutional Neural Networks and Transfer Learning**

At the Kapteyn Institute we are in the middle of an explosion in the number of celestial objects for three research fields in formation and evolution of galaxies and our solar system. To obtain large samples of special celestial objects we have obtained a leading role in two multi-color sky imaging surveys: KiDS and Euclid. The key challenge is to identify the three object types with high purity and completeness from an ocean of billions of celestial objects. Currently this requires a very large human effort in detection software and visual inspection. We have hit the limit with our current approach for KiDS. Euclid increases the problem by an order of magnitude, starting in only a little over two years

We urgently need the expertise of the CIT Data Science Team to see if we can solve the issue by drastically innovating the approach using Convolutional Neural Networks (CNN) plus Transfer Learning.

We have ~100 Terabytes of KiDS survey images containing ~200 million objects plus training sets ready for the three object types. The software tools resulting from this project will be integrated immediately in our survey system Astro-WISE and later interfaced to the Euclid Data Processing System.

If we are successful we would be one of the first in astronomy to achieve a multi-object classifier in imaging astronomy using Convolutional Neural Networks thanks to the CIT Data Science team