ICA (Independent Component Analysis), ISA (Independent Subspace Analysis) and TICA (Topographic Independent Component Analysis) are computational and statistical techniques which attempt to find hidden factors that underlie sets of random variables, measurements, or signals when the known classic methods fail completely. Applications of these algorithms can be found in many different areas. However, the purpose of this software package is focus on the image processing. It will read any formats of image files and use ICA, ISA or TICA as the principal model for natural images. Finally, we will see that these algorithms do provide some models that are very similar to the most sophisticated low-level image representation used in image denoising.

The ICA neural network model is based on FastICA and includes the phases of whitening, separation and estimation of basis vectors for different layers. FastICA is a parallel, distributed, computationally simple network, which requires little memory space. During the whitening, the image is linearly transformed so that the resulting vector has decorrelated components, which are then normalized to unity. The FastICA algorithm was applied using the hyperbolic tangent nonlinearity. Our experimental input data are patches from colored natural images.

The implementation of this approach requires selecting suitable parametrizations and estimation of parameters. Testing all possible combination of parameters would require a huge amount of experiments. In order to restrict their number we test the influence of one or two parameters at a time. We also propose a graphical user interface (GUI), which greatly reduces the amount of the test time.