MADNESS

MAP estimate with Deep Neural Networks for Source separation

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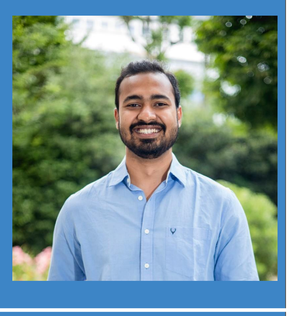

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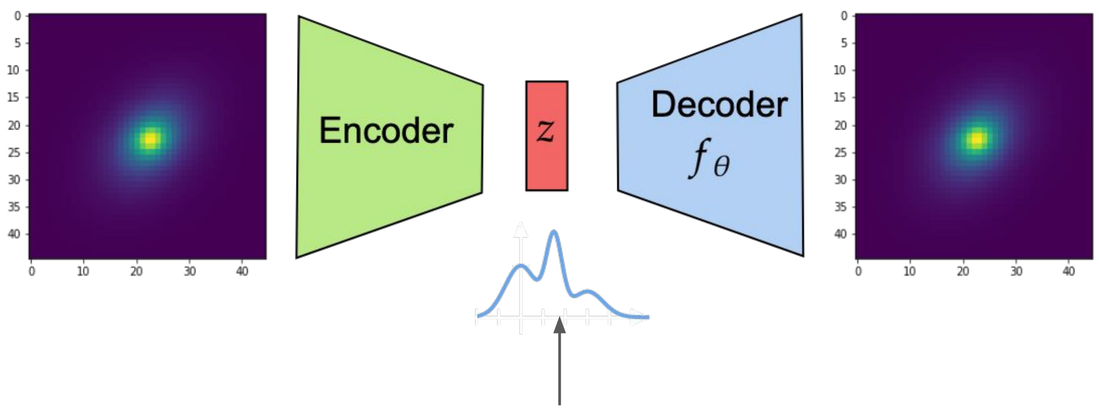
Deblending:

In LSST, more than 63% objects are expected to be blended.
Deblending is the inverse problem of separating these overlapping sources.

VAE for galaxy simulation:

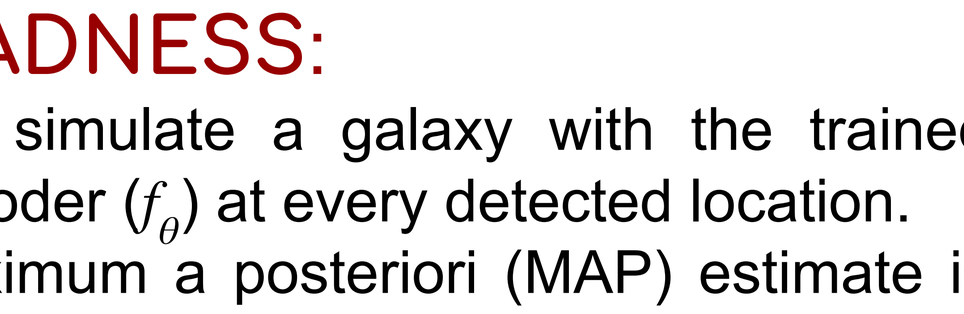
We train a Variational AutoEncoder using Galsim COSMOS galaxies.



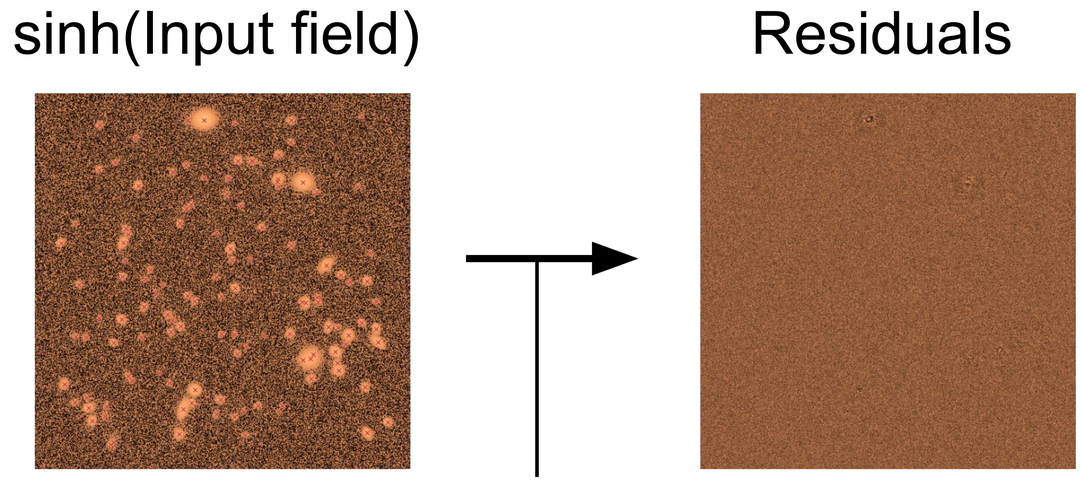
It maps the galaxies into an underlying latent space distribution.
New galaxies can be simulated by sampling from this latent distribution.

MADNESS:

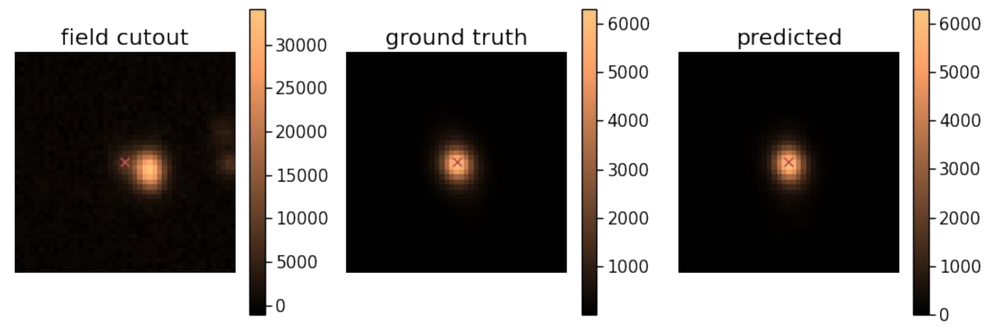
We simulate a galaxy with the trained decoder (f_θ) at every detected location.
Maximum a posteriori (MAP) estimate is obtained by a gradient descent in the VAE latent space.



Preliminary Results:

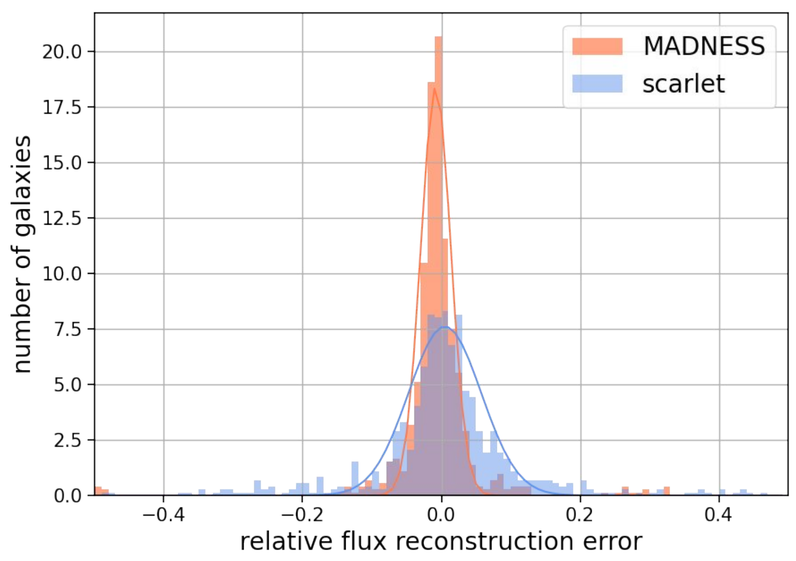


Example prediction:



Discussion:

Significant improvement over the state-of-the-art (scarlet) in galaxy flux reconstruction.



Conclusions, Future Work:

- Ongoing DESC project [251].
- Performance at par with state-of-the-art.
- Potential speed up with GPUs.
- Paper in preparation.

Future work:

- Evaluate the effect of detection errors.
- Deblend stars.
- Obtaining the full posterior.
- Handle artifacts in real data.

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