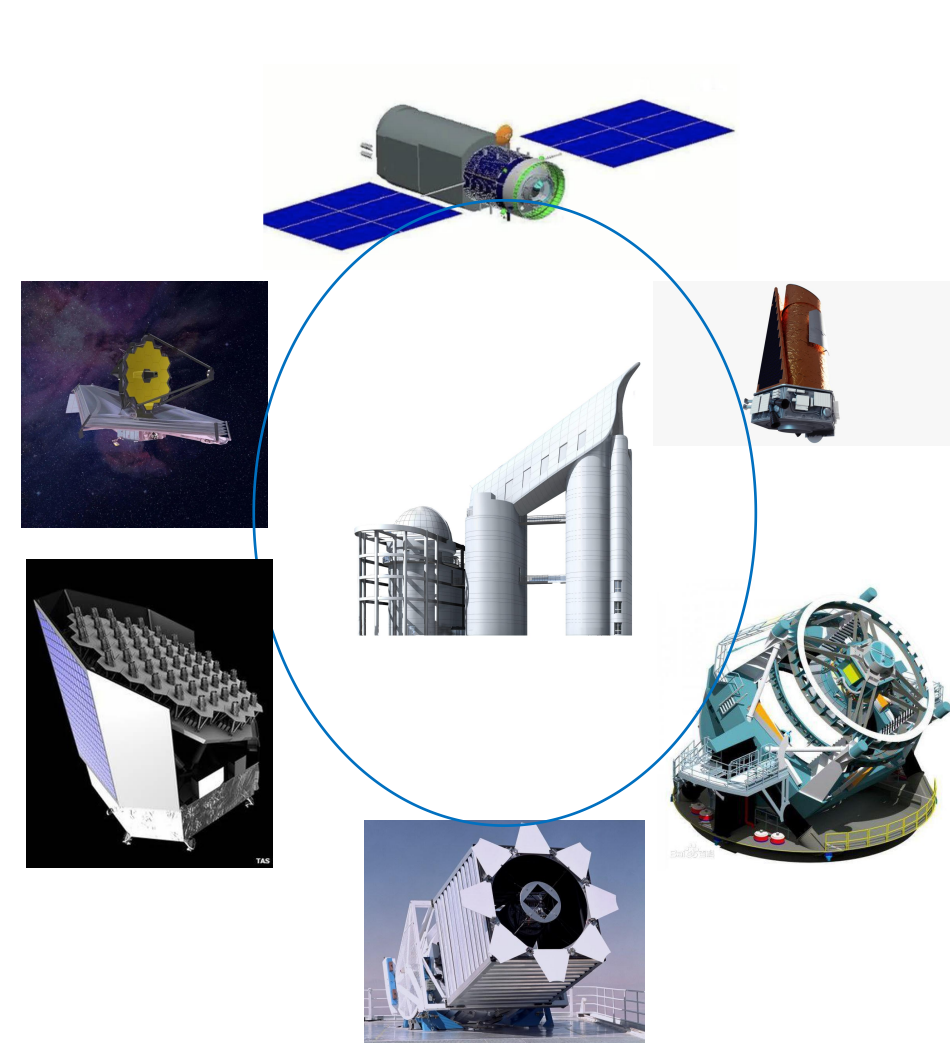
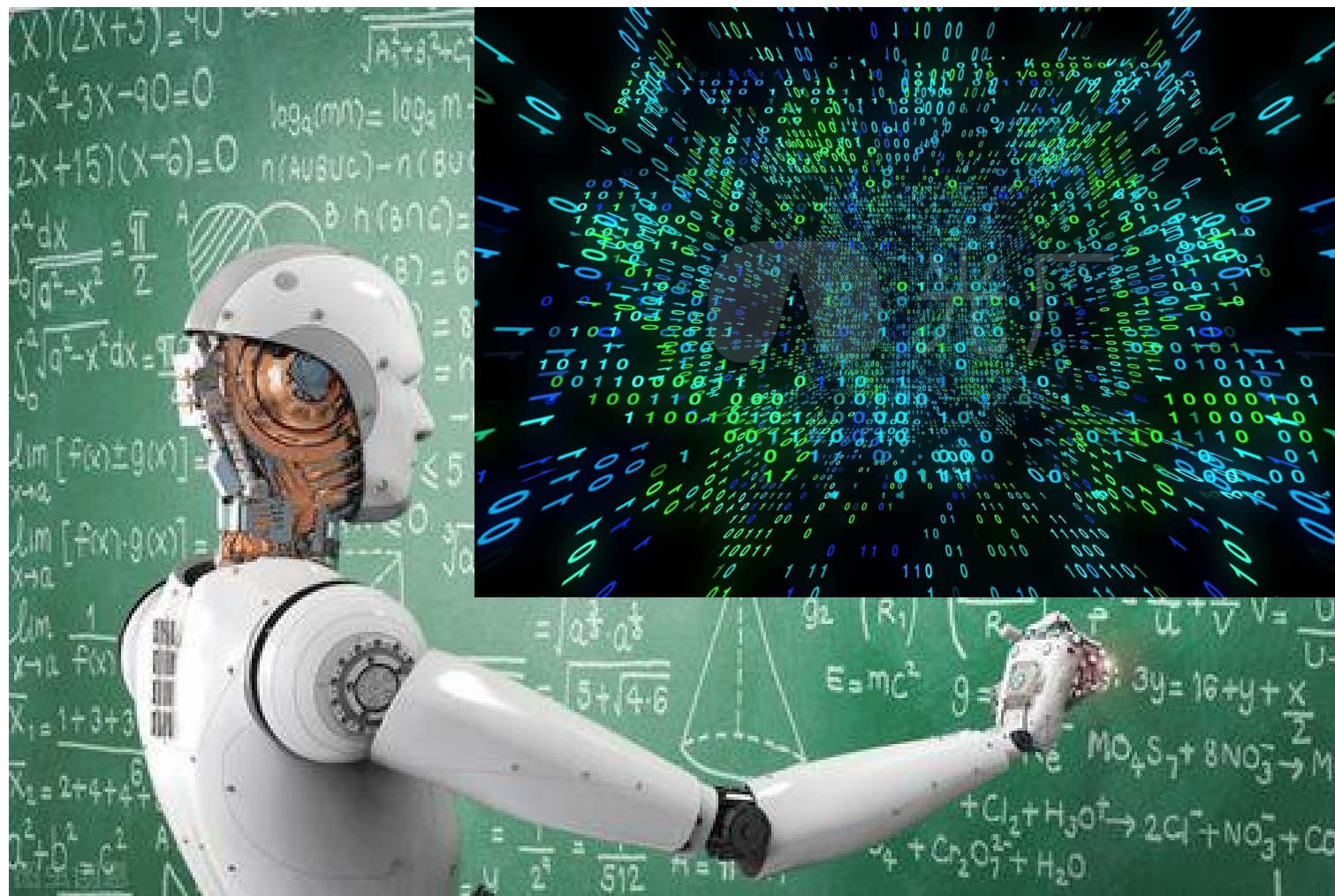


Machine learning in future LAMOST



罗阿理 国家天文台 桂林 2023年4月20日

Topics

- Challenge for astronomical sky surveys -- big data
- AI Solutions for sky survey images
- What role does LAMOST play in the photometric survey era
- Our plan

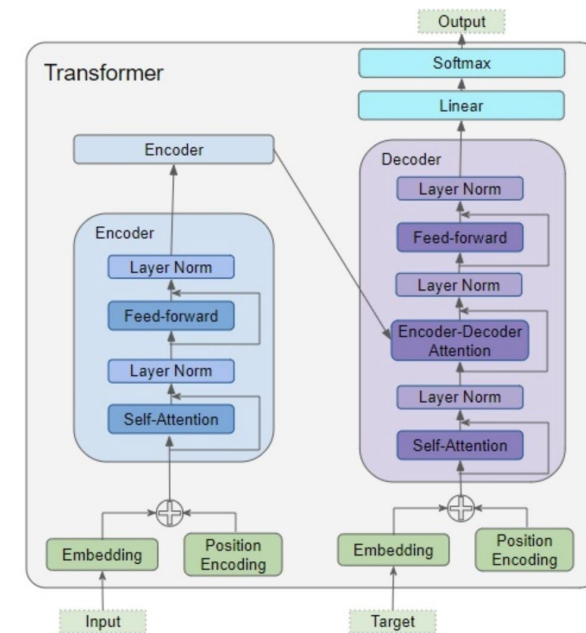
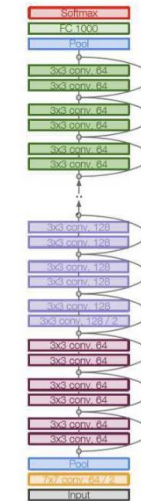
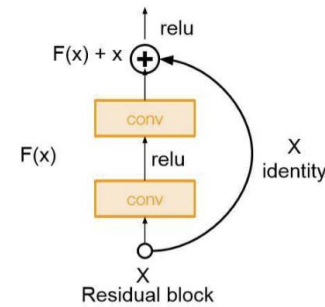
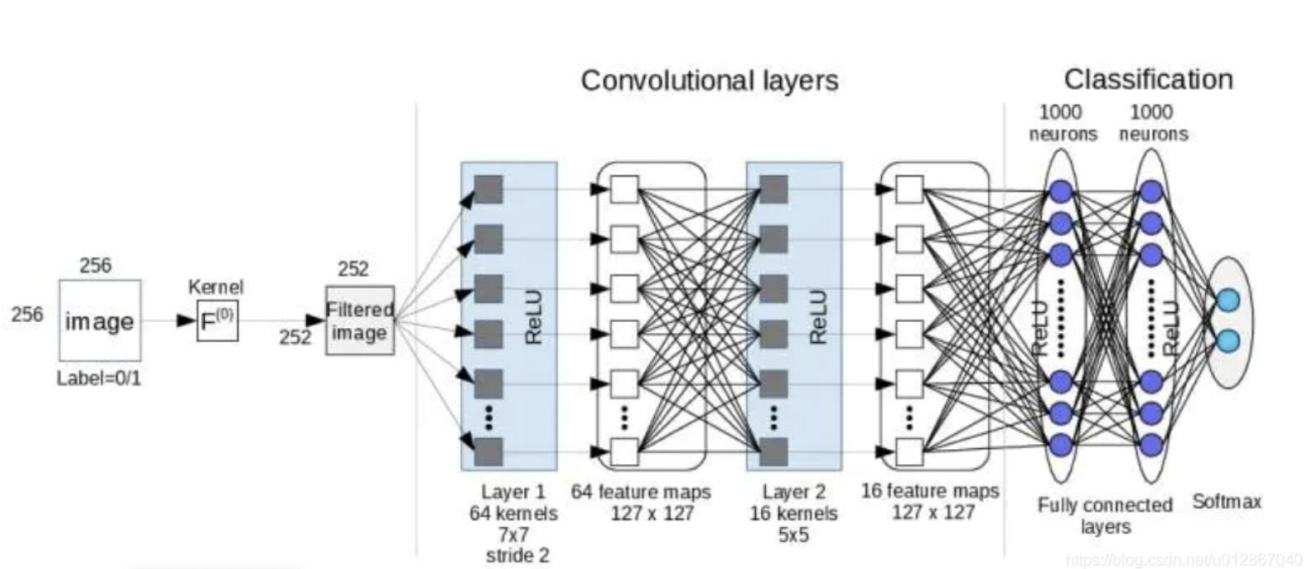
Challenge for Astronomical Sky Surveys

-- Big Data

- Data of huge quantity (Volume)
LSST, JWST, DESI, CSST
multiband/ time domain surveys produced PB and will get EB data
- Data of great complexity (Variety)
Electromagnetic (image/spectrum/time domain curve)
High energy particles, GW ...
- Fine-grained image recognition and retrieval
discriminative region localization & fine-grained feature learning
- Small samples of identified labels
augmentation, few-shot learning (FSL)
- Handling problem (Velocity)

AI solution for images

CNN -> ResNet -> Attention -> Transformer (AI)

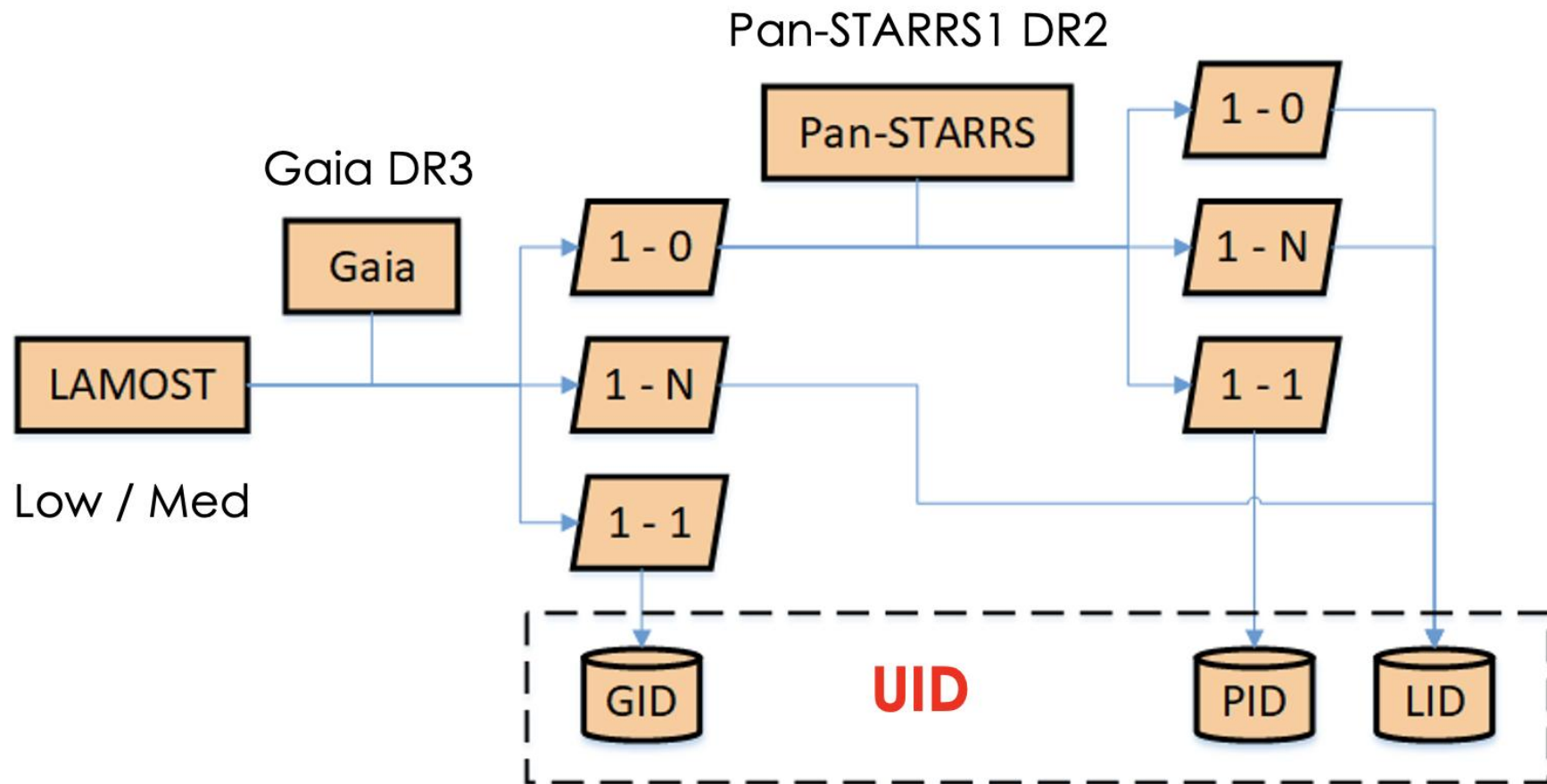


AI solution for sky survey images

- Target recognition / segmentation
- Point like source classification
- Physical character regression
- Generative model
- Visualization for high dimensional data

What role does LAMOST play in the photometric survey era

Why LAMOST



What role does LAMOST play in the photometric survey era

Why LAMOST

Low Resolution Catalog

Catalog	All	Document
LAMOST LRS General Catalog	FITS CSV	Description
LAMOST LRS Stellar Parameter Catalog of A, F, G and K Stars	FITS CSV	Description
LAMOST LRS Line-Index Catalog of A Type Stars	FITS CSV	Description
LAMOST LRS Catalog of gM, dM, and sdM stars	FITS CSV	Description
LAMOST LRS Multiple Epoch Catalog	FITS CSV	Description
LAMOST LRS Observed Plate Information Catalog	FITS CSV	Description
LAMOST LRS Input Catalog	FITS CSV	Description
LAMOST LRS Catalog of Cataclysmic Variable Stars	FITS CSV	Description
LAMOST LRS Catalog of White Dwarf Stars	FITS CSV	Description
LAMOST LRS Catalog of Emission Line Features of QSOs	FITS CSV	Description
LAMOST LRS Catalog of Stellar Population Synthesis of Galaxies	FITS CSV	Description

How does LAMOST team contribute to the community

Which kind of positive sample can LAMOST provide?

- Generate training images with identified targets, which are known objects.
- Build training images individually for any survey.

Summary

- Review the challenge for astronomical sky surveys -- big data
- Possible solutions for photometry survey images
- Suggests the role of LAMOST in the survey era
- Our plan

Thanks