Trigger subimage analysis by IA

Summary of Work by Baptiste Hubert

SVOM BA-T meeting
260325

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Developed by Baptiste Hubert (CEA trainee, 250901-260228)

Machine learning, using a pretrained CNN ResNet18 (18 layers, 11M params)
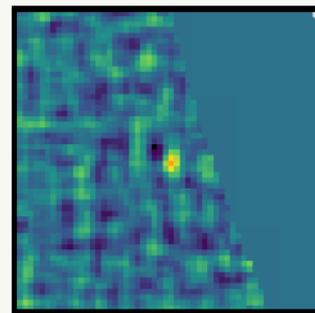
- Input:
  - 56x56 pixel sub-image (augmented to 224x224 ResNet18 input)
  - AD1 information (SnrMax, others SnrStd, position SkyI, SkyJ…)
- Output:
  - Opinion: Point-like source found (YES | NO) + Confidence estimate (50%-100%)
- Trained with > 600 SubImages from the AlertSequences of 1.5 yr
  - Using the TriggerVerdict issued by the TA team on ETOG-Validation redmine

- We will integrate the IA into iFSCtools (ECLAIRs Trigger page)
  - Below the sub-image display, information for currently displayed sub-image:
    - Opinion if Point-like source (YES | NO) + confidence
    - Opinion if Point-like source elsewhere than in central tile + confidence
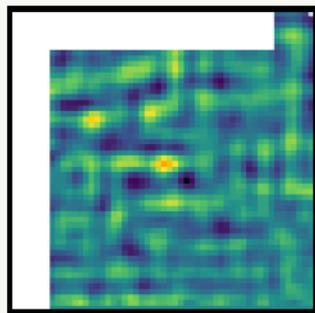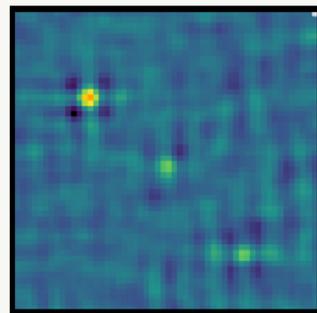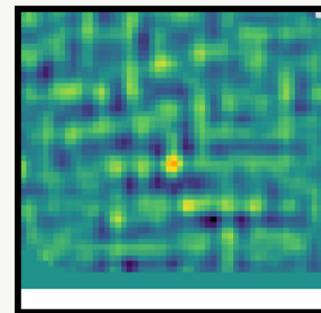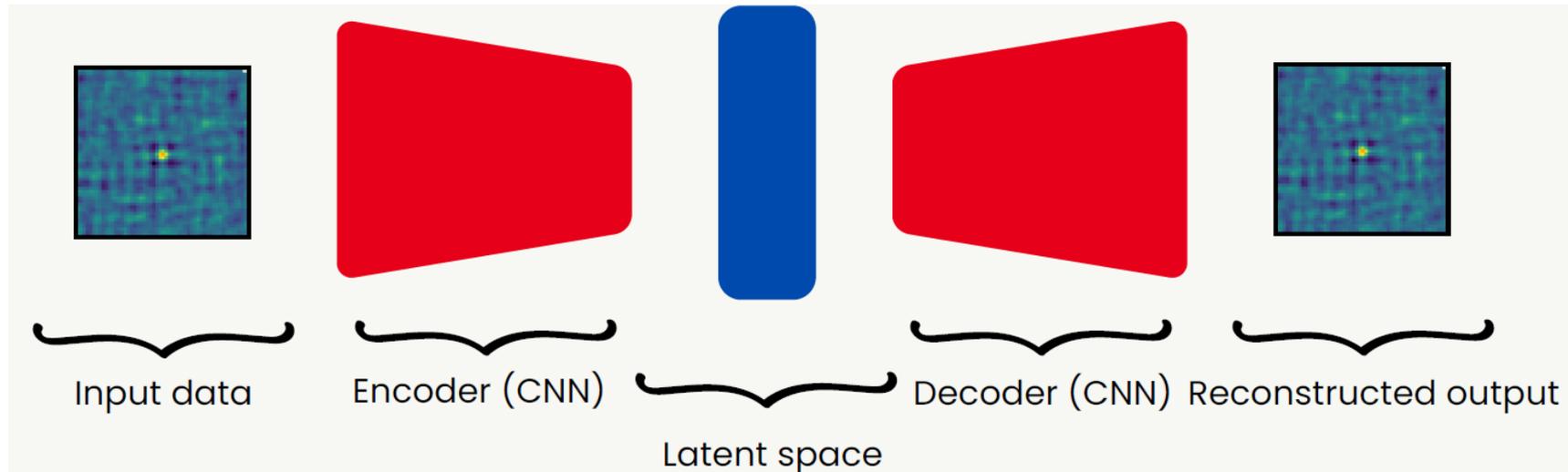

Incomplete images   *Unclear decision*   *Earth appearing*   *Incomplete + unclear*

Continuation by Louise Delfosse (CEA trainee, 260330-260831)
Machine learning, using auto-encoders (TBC)

Particular type of neural network for unsupervised learning, very efficient for **anomaly detection,** 2 parts :
- The encoder that compress the input data in a latent space
- The decoder that tries to reproduce the input using the data in the latent space

When trained, if the input is an anomaly, the decoder poorly reconstruct the input
Difference (distance) between input and output give the confidence in True source