

# Onboard AI with TensorFlow Lite on the SmartCam App

Georges Labrèche

2020-12-13

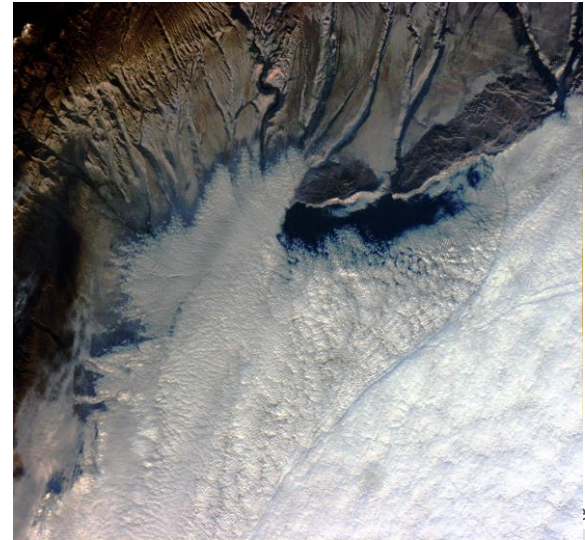
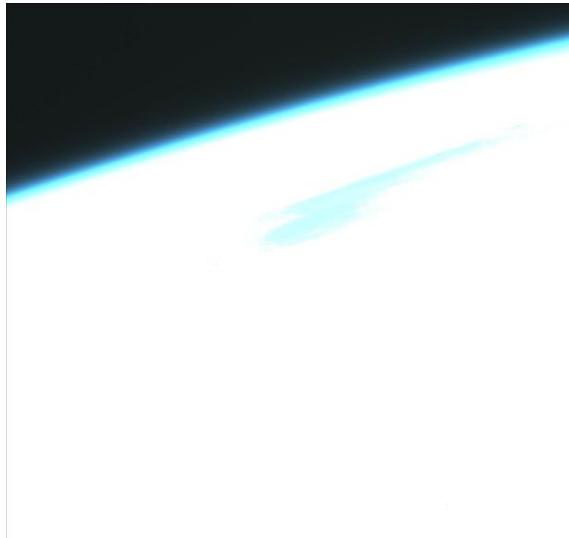
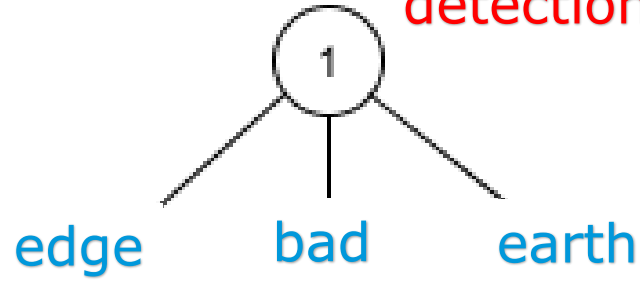
# Background



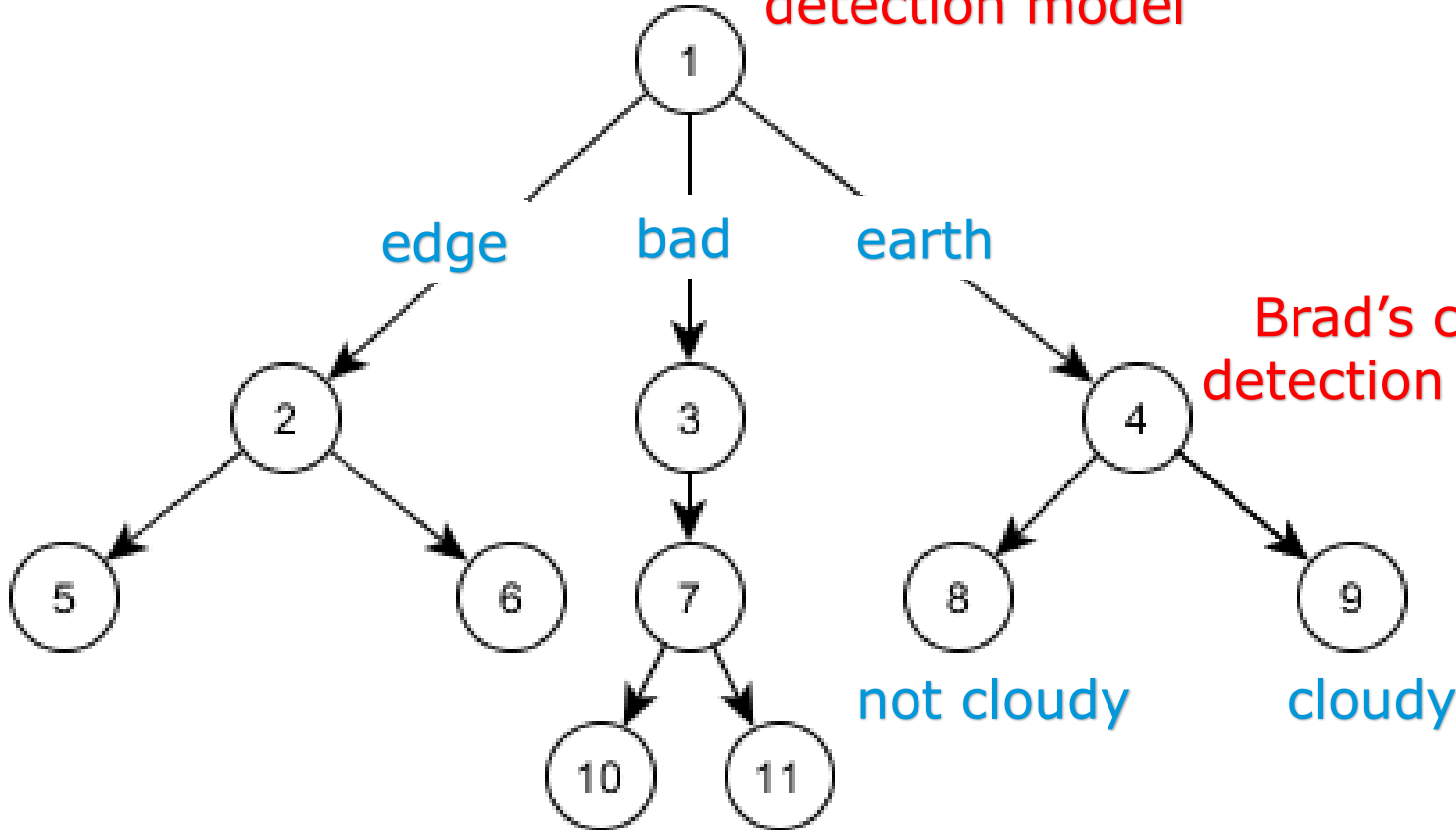
- Problem and Solution:
  - Lots of “bad” images downlinked during camera commissioning.
  - Not great for data downlink prioritization.
  - Trained image classification model to run as an on-board SmartCam app.
  - Only downlinking images of value.
  - Discard “bad” images immediately after image acquisition.
  
- App was designed with re-usability in mind:
  - Can run image classification models provided by other experimenters.
  - Can create model pipelines and branching rules.
  - Uses industry established AI framework attract non-space sector experts.



# Janet's picture type detection model



# Janet's picture type detection model



# Brad's cloud detection model

not cloudy cloudy



**Data**

**Development**

**Training/Evaluation**

**Deployment**





**Data**

**Development**

**Training/Evaluation**

**ops-sat**

**Deployment**

- Crowdsource image classification models and start building an ML chain.
- Deploy other AI Inference API Frameworks on SEPP and FPGA:
  - The SmartCam app uses TensorFlow Lite C API on SEPP.
  - But other popular frameworks include PyTorch and CAFFE.

# That's all folks, thank you!

[Georges.Labreche@esa.int](mailto:Georges.Labreche@esa.int)