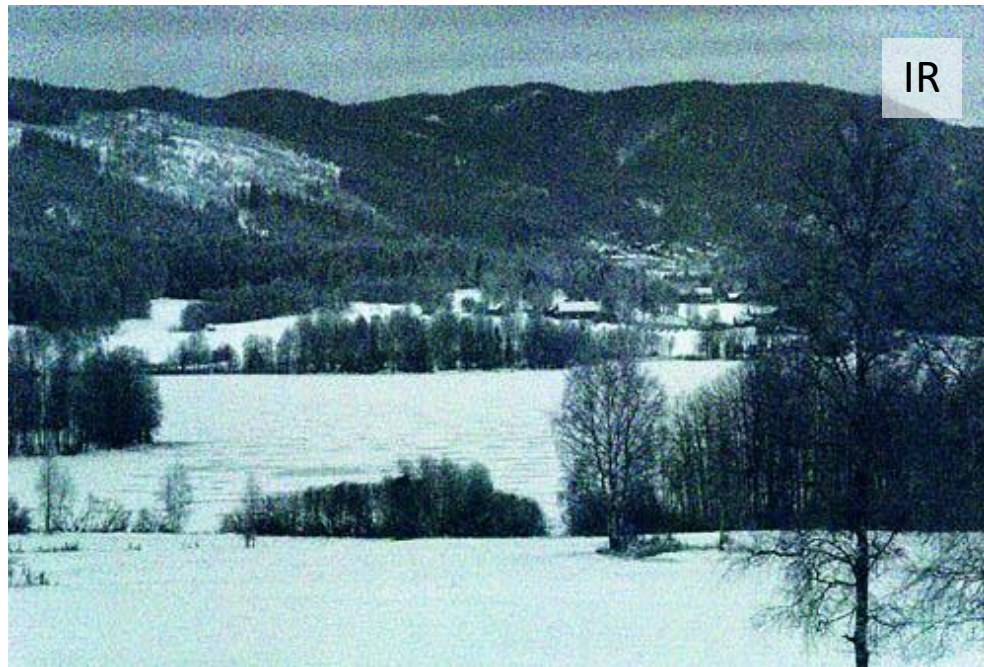# Estimation and removal of noise from Images

Noise

- Where does noise come from?
  - Sensor (e.g., thermal or electrical interference)
  - Environmental conditions (rain, snow etc.)
- Why do we want to denoise?
  - Visually unpleasant
  - Bad for compression
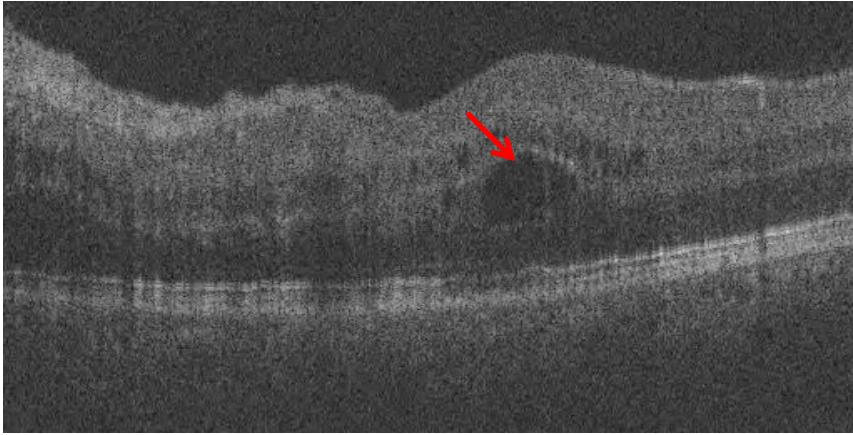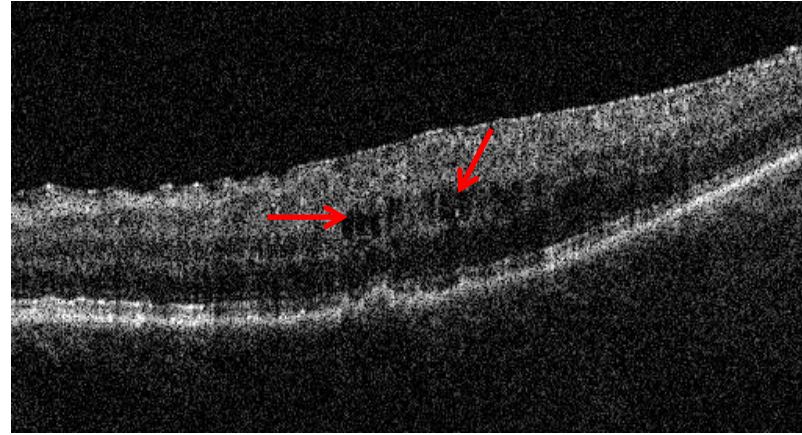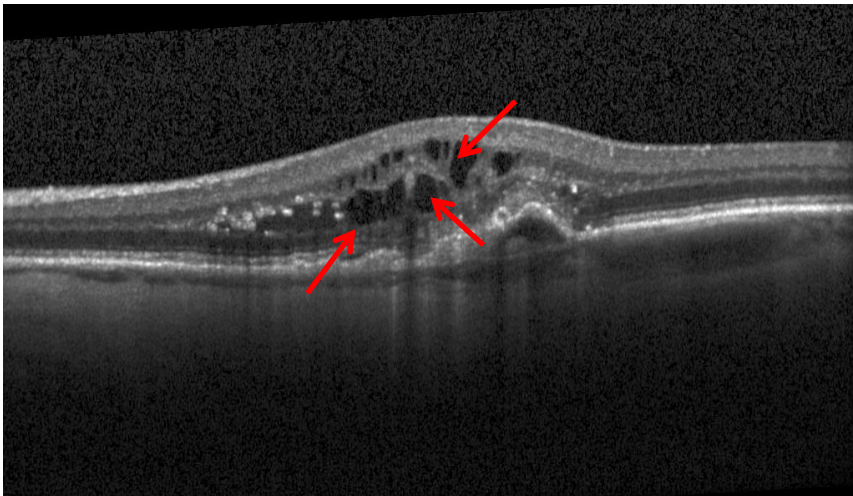 - Bad for analysis

Indoor – low light

IR

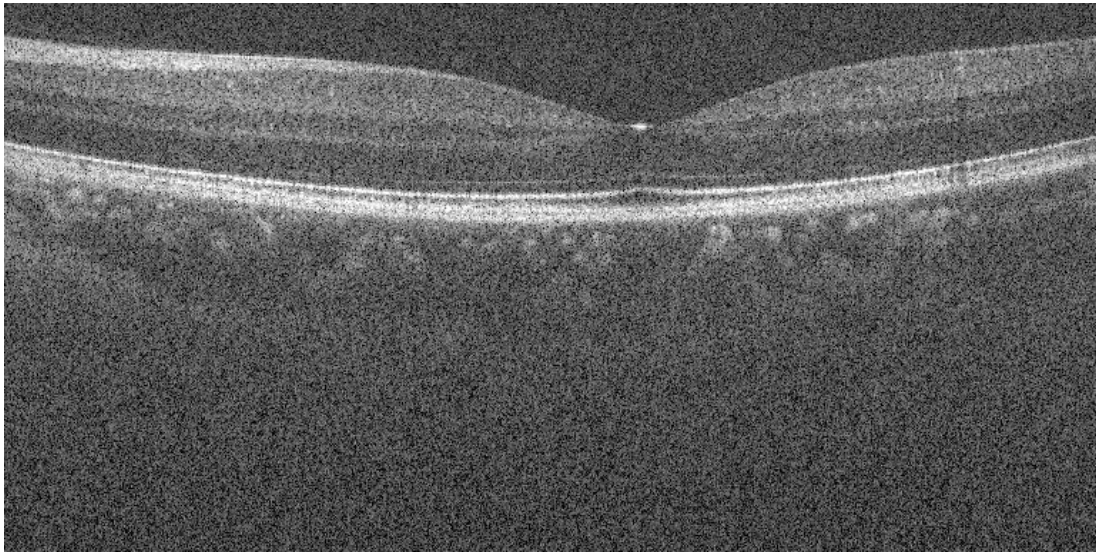US

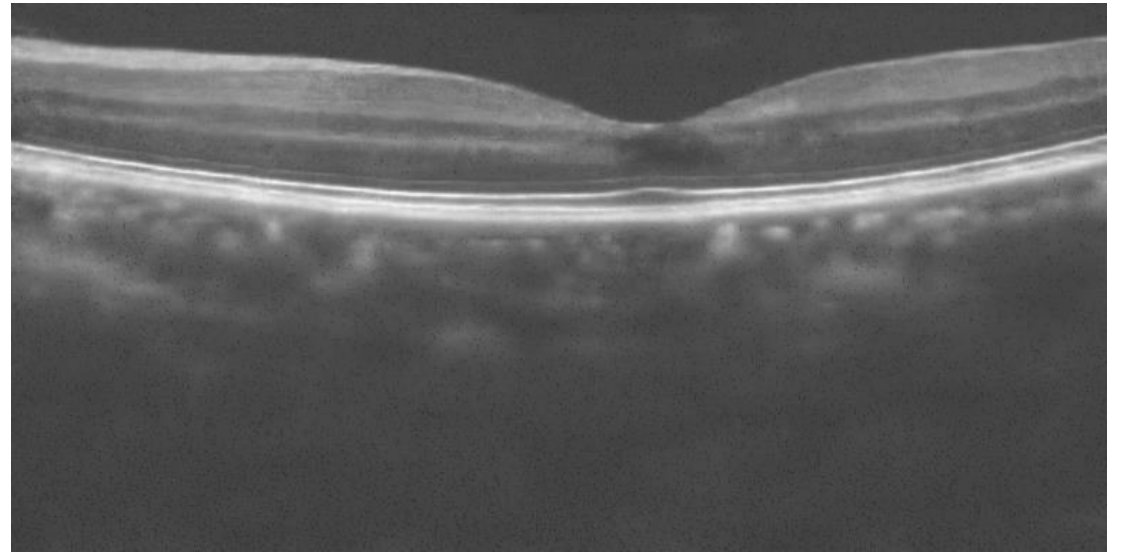# OCT images acquired with different machines

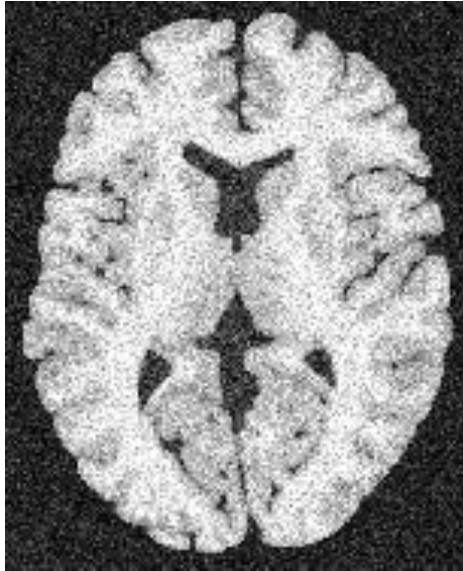Cirrus

Nidek

Spectralis

Topcon

Arrows indicates the retinal cysts

OCT images : Before denoising
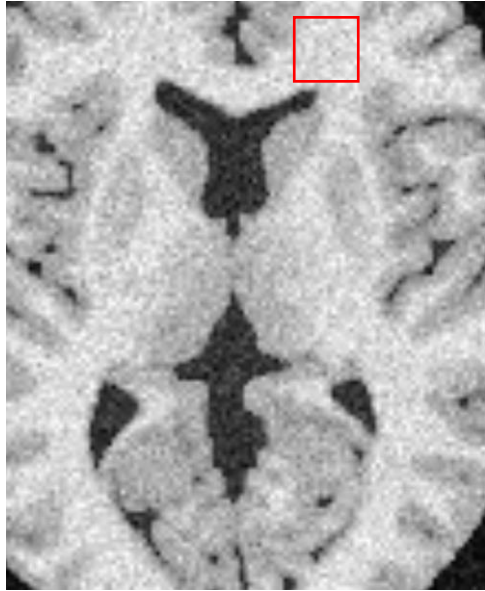

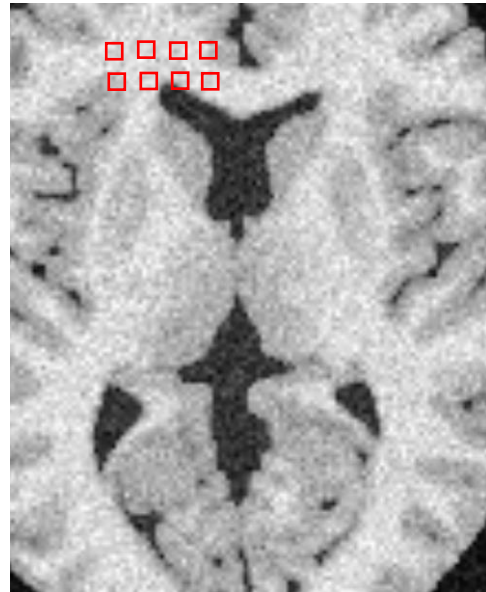OCT images : After denoising

Rician

Salt & pepper

Periodic noise

How to measure the level of noise in an image ?

$$\sigma = \sigma_L$$

$$\sigma = \text{mode}\{\sigma_L\}$$