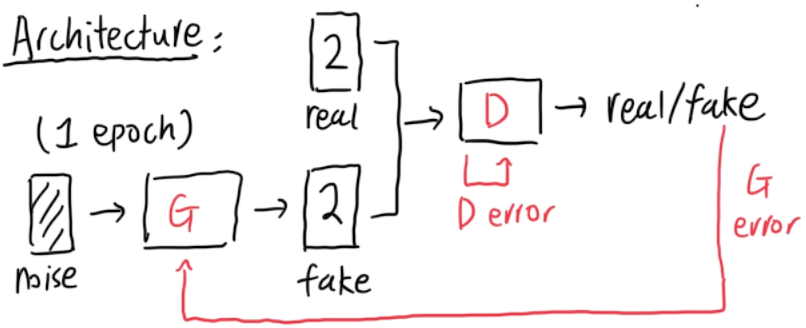
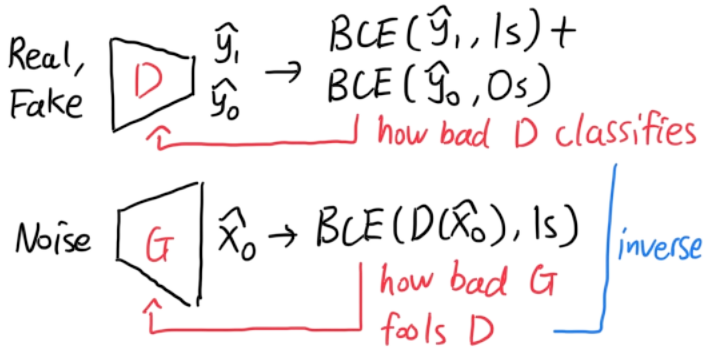
23) Generative Adversarial Network

GAN

- 2 Families of All Math Models:
  ① Discriminative models: classify or characterize existing data (x → CNN → it's A) (FFN or)
  ② Generative models: create new data (□ → "AE-Decoder" → [A])
- GAN: ② that has generator (G) & discriminator (D) competes against each other
  - Overview: G tries to transform fake image from random noises
    D tries to catch the fakes from the reals
    Over training, both D & G get sharp
  - Architecture:





  - Applications: ① Create new training data ② Super-resolution upscaling
    ③ No privacy concerns (Train fake tumor images generated from original dataset)
  - Limitations: ① Sensitive to model architecture & dataset
    ② Model performance evaluation is qualitative (no #s)
    ③ Category imbalance biases GAN to generate towards 1 class
    ④ Overtrain GAN harms G bc D reaches ~0