Problem1: Check for issues in the Bare PCB

* No breakage in tracks
* Distance between Tracks lesser than tolerable distance
* Distance between Solder pads lesser than tolerable distance
* Masking missing, copper visible on the track,

Problem2: Related to placement of components on PCB, like:

* is component present
* is component right
* is component soldered correctly
* is polarity of component right

**Input -** Raw Image  
**Expected Output -** Labelled Image (Labels – Error, Warning, Doubtful)

**Overall Flow:**

Raw Image 🡪 Image Recognition 🡪 Image Processing on Business Logic 🡪 Labelled Image

Approach to be used

* For Image Recognition – Supervised Learning

Pointers:

* Image Recognition = Object Detection (Pads, Tracks, GND regions, empty regions)
  + Image Classification
  + Object Localization

Refs:

* Object Recognition - <https://machinelearningmastery.com/object-recognition-with-deep-learning/>
* Image Processing - <https://vincmazet.github.io/bip/detection/intro.html>
* PCB related links
  + <https://docs.edgeimpulse.com/experts/image-projects/pcb-defect-detection-with-computer-vision-raspberry-pi>
  + <https://www.kaggle.com/datasets/akhatova/pcb-defects?resource=download>
  + <https://github.com/Ixiaohuihuihui/Tiny-Defect-Detection-for-PCB>
  + <https://www.nature.com/articles/s41598-022-16302-3>
  + <https://www.sciencedirect.com/science/article/pii/S2590123023000956>
  + <https://www.techscience.com/cmc/v70n1/44420/html>
  + <https://www.mdpi.com/1424-8220/21/15/4968>
* <https://nanonets.com/blog/image-recognition/>
* <https://marutitech.com/working-image-recognition/>
* <https://viso.ai/computer-vision/what-is-computer-vision/>