

Image Processing Task

Task 1: Report about Filters and edge detection

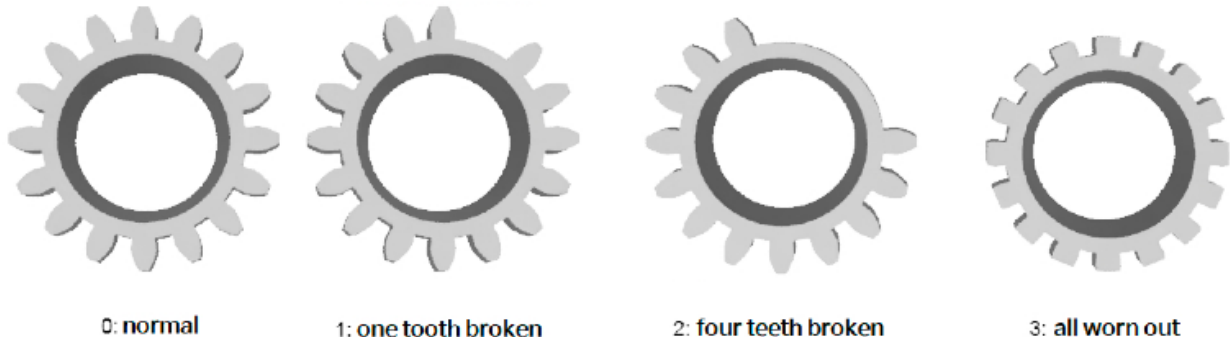
Please write a report about each of the following topics:

- Sobel Filter
- Laplacian Filter
- Canny Edge Detector
- Contours in Image processing

You should aim for 1-2 paragraphs per topic. Mention briefly how they work, what they are used for. Include some pseudocode/actual python code explaining how they work. No need to explain the math behind them

Task 2: Gear Inspection System

In our gear production process, there's a risk of gear teeth getting damaged during milling. We need to develop a visual inspection system using OpenCV to automatically detect any defects in the gears.



- **"ideal.png"**: Represents an ideal gear without defects.
- **"sample2.png" to "sample6.png"**: Show examples of gears with various defects.

Your task is to create an inspection sequence that can identify and categorize damaged gears by comparing them to the ideal sample.

the system should detect the number of **broken** or **worn** teeth for each gear and print this information to the CLI.

HINT: you will need to use thresholding, Bitwise Operations to find the differences between the ideal and sample. To figure out if it is broken or worn out you will need to use contours

You can download the images from the following link:

<https://drive.google.com/file/d/1C8VV8UxICRhdFzOSnyv9XGaj6CBiYakl/view?usp=sharing>

Useful to watch: [OpenCV Course - Full Tutorial with Python](#)

- Contour Detection 57:06
- Bitwise Operations 1:44:27
- Thresholding 2:15:22

BONUS: Some gears will have a different inner diameter than the original. Try and detect whether each gear's diameter is larger, smaller or identical to the ideal gear

Submission Details:

- Create a new branch named (Image Processing) in the repo you made earlier (name_alex eagles_phase1) and upload the task to the branch.
- Submit the Repo link here:
https://docs.google.com/forms/d/e/1FAIpQLSczhnM_PNj6DrcFoT71ojC4BJZtPzZQCaFk8eBOfq23ytcBuw/viewform?usp=sharing
- Deadline: August 22