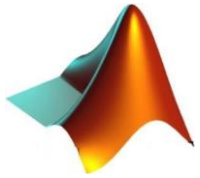

SIMPLIFIED CURVE FITTING

EEE 212 Project

BY

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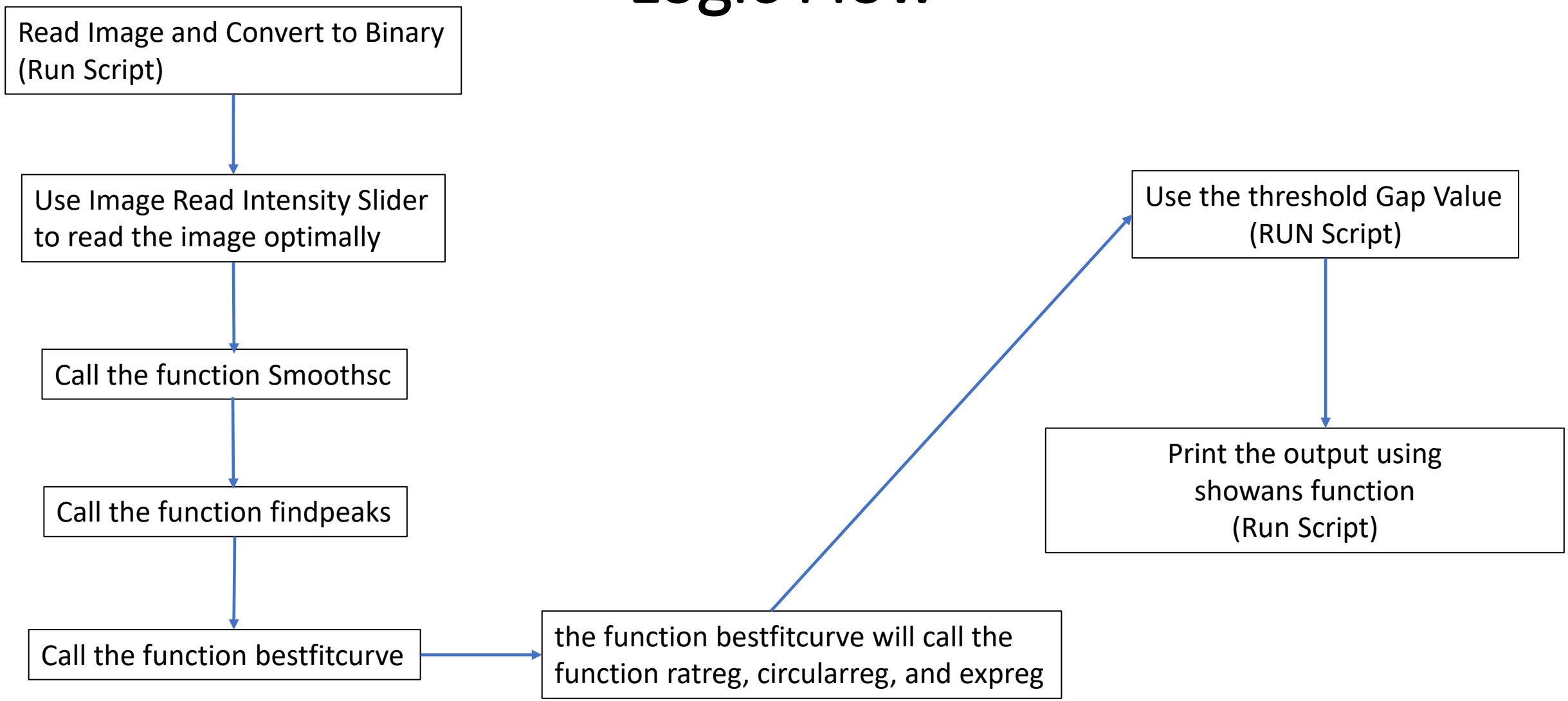
STATEMENT OF THE TOPIC

To write a code that will segment a particular curve and find easy equation for that portion.

OUR APPROACH TO THE PROBLEM

1. Smoothing the image points.
2. Finding out the peaks and crests.
3. Dividing the image points into several segment through the peaks and crests.
4. Comparing these segments with some common equations.
5. Selecting the equation that fits best to each of the segments.

Logic Flow


Read Image and Convert to Binary (Run Script)
Use Image Read Intensity Slider to read the image optimally
Call the function Smoothsc
Call the function findpeaks
Call the function bestfitcurve
the function bestfitcurve will call the function ratreg, circularreg, and expreg
Use the threshold Gap Value (RUN Script)
Print the output using showans function (Run Script)

EQUATIONS USED TO FIT THE CURVE

1. Linear equation: $y=mx+c$
2. Second degree polynomial : $y=ax^2+bx+c$
3. Third degree polynomial: $y=ax^3+bx^2+cx+d$
4. Circular equation: $x^2+y^2+2gx+2fy+c=0$
5. Rational equation : $y = (x+A)/(Bx+C)$
6. Exponential equation :$y = e^{ax+b}$

SMOOTHING

Why smoothing was necessary?

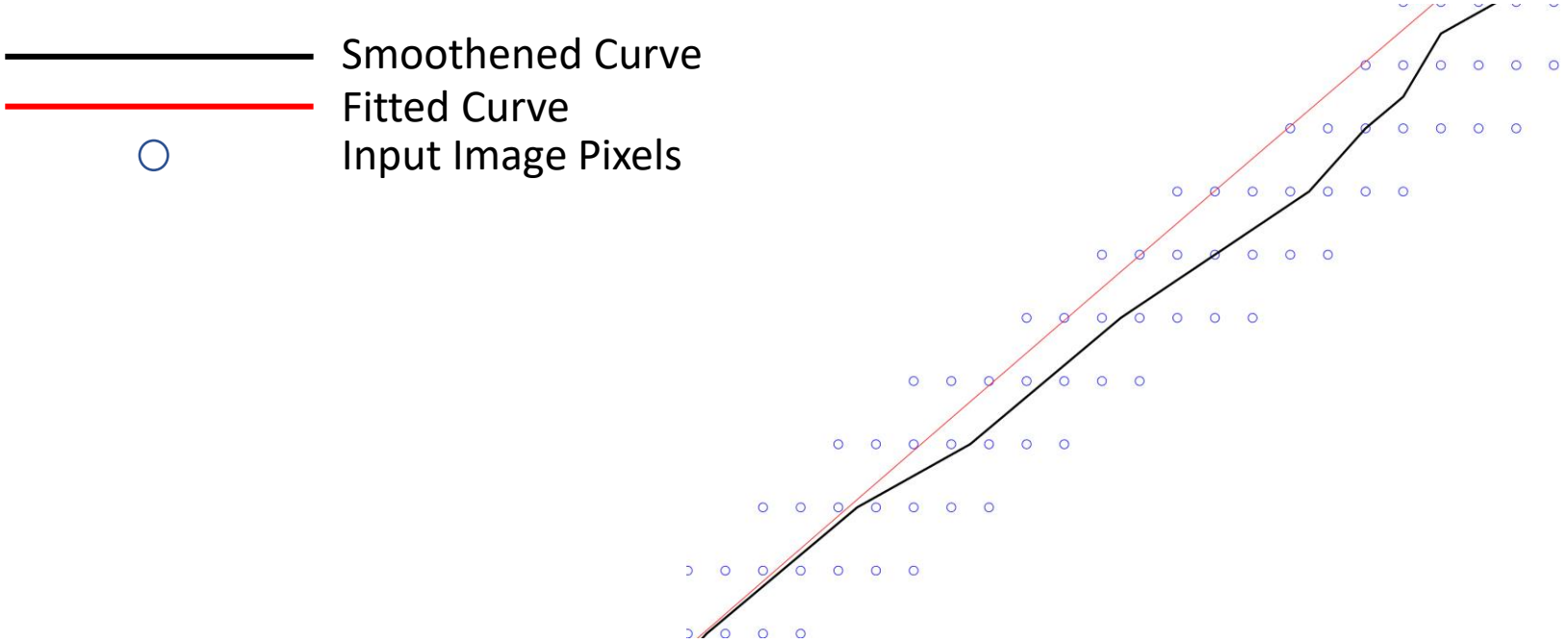


Figure: A Zoomed in Version of the Output

PEAKS AND CRESTS

Peak:- A peak is the point whose ordinate is greater than that of the adjacent points, mathematically $f(x)>f(x-h)$ & $f(x)>f(x+h)$.

Crest:- A crest is the point whose ordinate is smaller than that of the adjacent points, mathematically $f(x)<f(x-h)$ & $f(x)<f(x+h)$.

SEGMENTATION

- The given curve was segmented through the peaks and crests.
- Then we tried to fit an equation for each segment.

Demonstration

LIMITATIONS OF THE CODE

- The fitted curve is not very accurate at the peak points;
- Also, the curve is not very accurate to find out any vertical or horizontal line present in the image;
- There is no intelligent equation matching for faster equation match;
- The equation library is not too big;
- The advanced image processing is not done to remove the noise from the input picture.

FOR FUTURE WORK

- A more sensitive algorithm to find out the bending and flat lines in the curve accurately;
- New approach in segmentation to eliminate the peak problems.
- Comparing with more equations;
- Advanced Image Processing to remove the noise from the picture;
- Implement the project in case of autonomous driving vehicle;

Misc. Discussion

Question and Answer Session