

A1-1 report

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alpha (α): Controls the continuity of the snake. Larger values will make the snake act like a rigid rod, while smaller values will make it more flexible.

beta (β): Controls the curvature of the snake. Larger values make the snake smoother, while smaller values allow it to form more intricate shapes.

gamma (γ): The time step in each iteration. It's a balance between accuracy and speed of convergence.

kappa (κ): A coefficient to control the influence of the external energy on the snake.

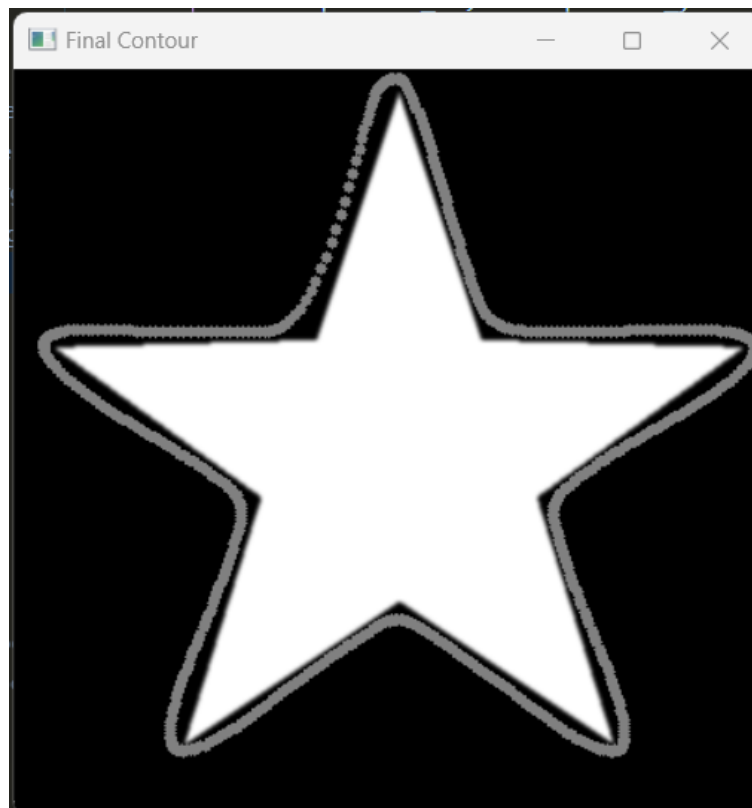
w_line: Weight of the line energy, which pulls the snake to regions of the image with intensities similar to the snake points.

w_edge: Weight of the edge energy, which attracts the snake to edges in the image.

w_term: Weight of the terminal energy, which might be used to detect corners or end-points.

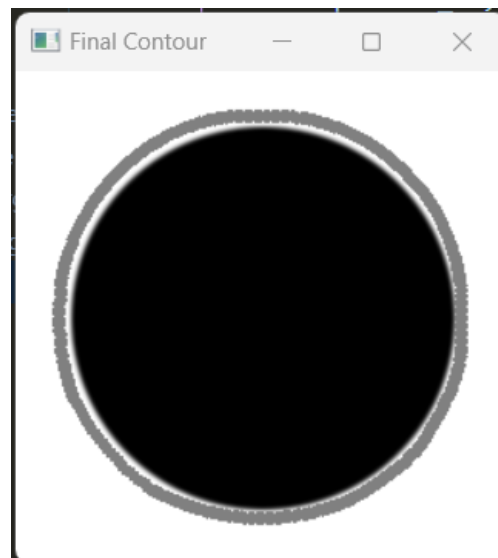
Star:

```
alpha = 0.05  
beta = 2  
gamma = 1  
kappa = 2  
w_line = 0.01  
w_edge = 1  
w_term = 0.01
```



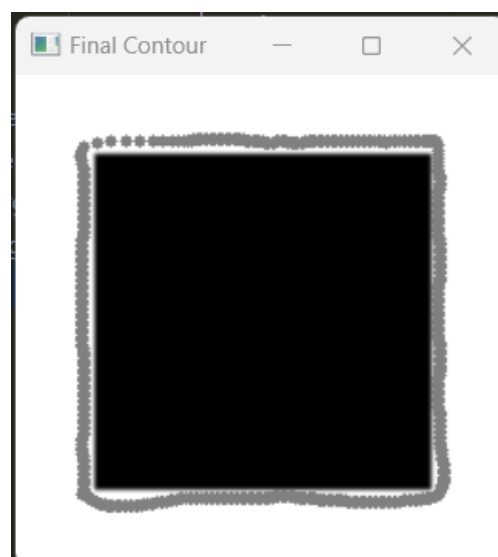
circle:

```
alpha = 0.1  
beta = 3  
gamma = 1  
kappa = 2  
w_line = 0.01  
w_edge = 1  
w_term = 0.01
```



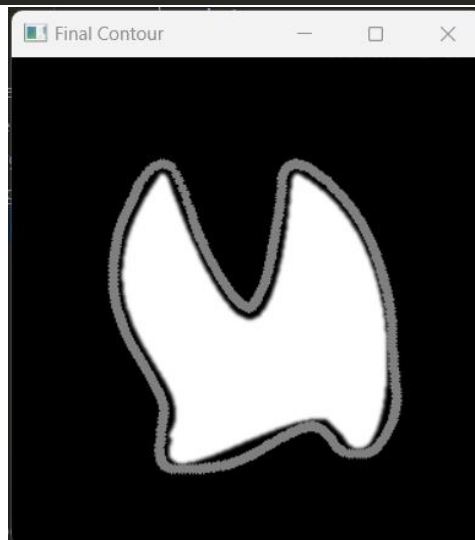
square:

```
alpha = 0.05  
beta = 0.05  
gamma = 1  
kappa = 2  
w_line = 0.001  
w_edge = 1.1  
w_term = 1
```



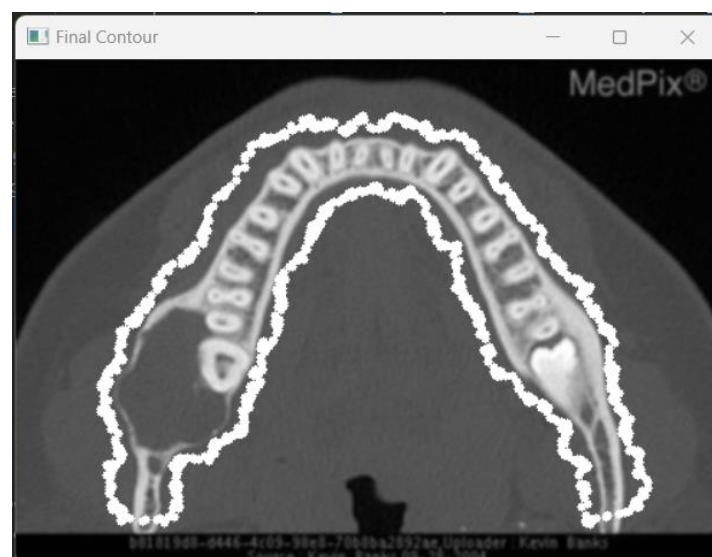
shape:

```
alpha = 0.06  
beta = 0.6  
gamma = 1  
kappa = 2  
w_line = 0.001  
w_edge = 1.5  
w_term = 0.5
```



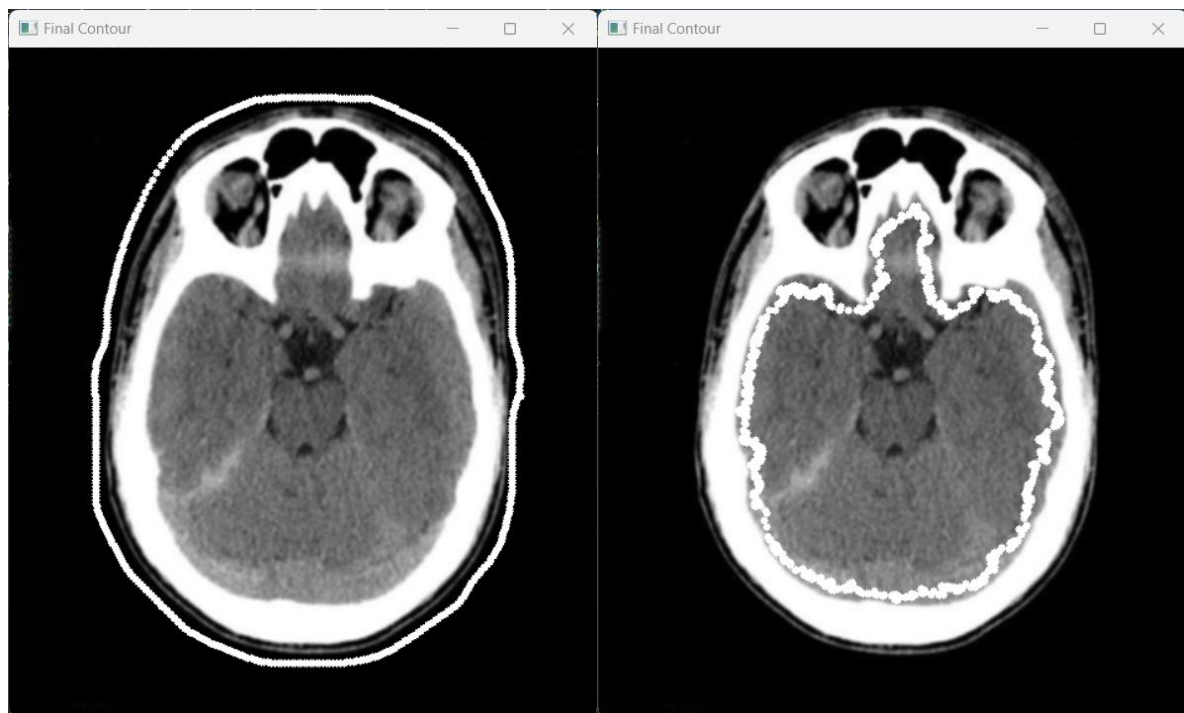
dental:

```
num_interpolated_points = 1500 # Number of interpolated points  
alpha = 0.06  
beta = 1  
gamma = 1.1  
kappa = 2  
w_line = 0.001  
w_edge = 2  
w_term = 0.5
```



outer layer of the brain (left image below):

```
alpha = 0.06  
beta = 1.2  
gamma = 1  
kappa = 3.5  
w_line = 0.001  
w_edge = 2.5  
w_term = 0.01
```



inner contour of the brain (right image above):

```
alpha = 0.6  
beta = 2.5  
gamma = 1.5  
kappa = 3  
w_line = -0.001  
w_edge = 2.5  
w_term = 0.01
```

right eye hole:

```
alpha = 0.08  
beta = 1.5  
gamma = 1  
kappa = 2.5  
w_line = 1  
w_edge = 3  
w_term = 0.01
```



vase:

```
alpha = 0.2
beta = 2
gamma = 1
kappa = 2
w_line = 0.001
w_edge = 1.2
w_term = 0.5
```



Answer to the bonus question:

C_x and C_y are the first-order derivatives of the image intensity in the x and y directions, respectively. They represent the gradient. C_{xx} , C_{yy} , and C_{xy} are the second-order derivatives (in terms of x and y). The numerator represents the gradient direction, which is the change in intensity of the image, with second-order derivatives. The nominator provides information about the bendiness or the degree of turning of the curve. The denominator acts as a normalizing factor. The first-order derivatives capture the square of the slope of the curve at a point. It adjusts or scales this information based on the steepness or the gradient of the curve.