

# Ant Colony Optimization for Image Edge Detection

Anna Veronica C. Baterina, Carlos M. Oppus

Department of Electronics, Computer, and Communications Engineering  
Ateneo de Manila University, Philippines

# Image Edge Detection Method

## Edge Extraction

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Grayscale Edge Information



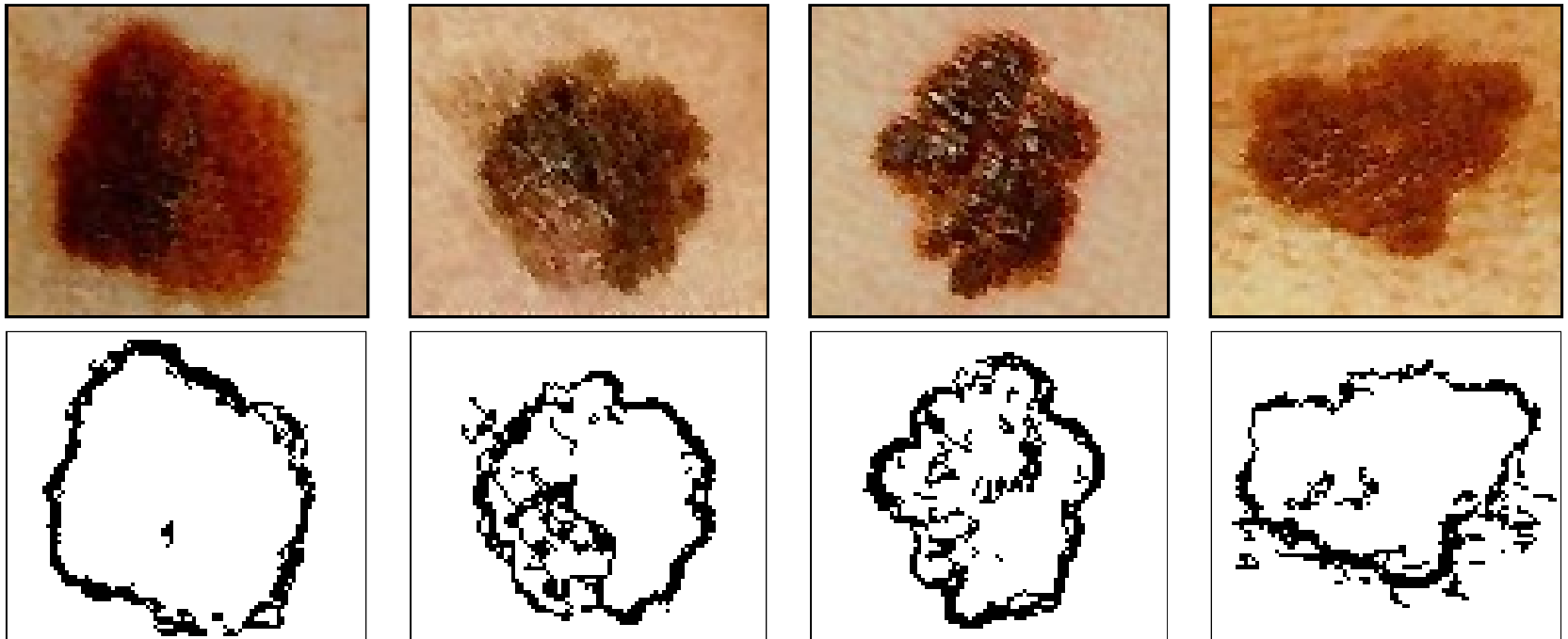
Binary Edge Information



# Possible applications of image edge detection?

# Skin Images

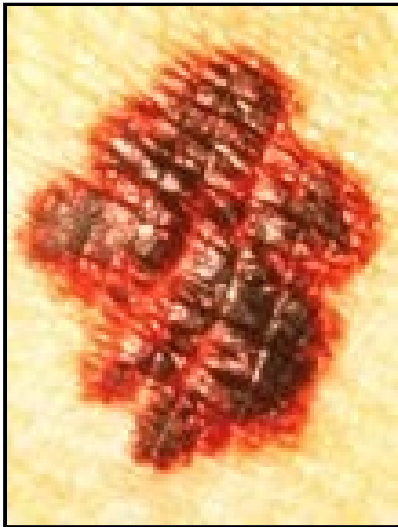
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$N = 10$   $L = 40$   $\mathcal{L} = 40$   $q_0 = 0.75$   $\beta = 1$   $\xi = 0.05$   $\rho = 0.1$   $\bar{\eta}_{min} = 0$

# Skin Images

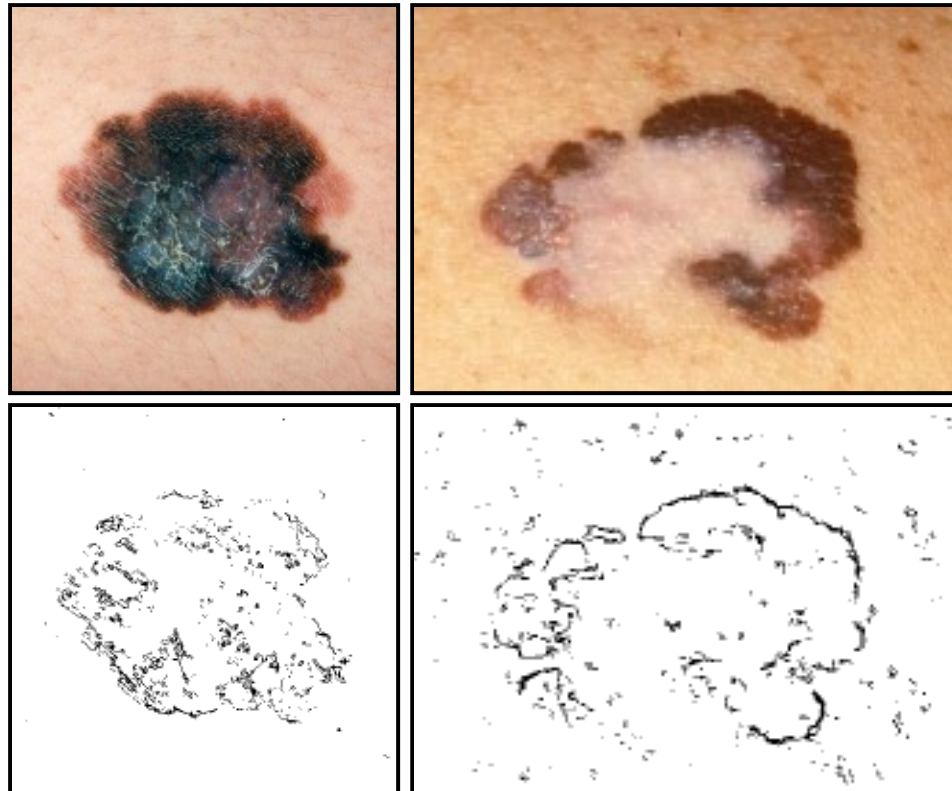
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$N = 10$   $L = 40$   $\mathcal{L} = 40$   $q_0 = 0.75$   $\beta = 1$   $\xi = 0.05$   $\rho = 0.1$   $\bar{\eta}_{min} = 0$

# Skin Images

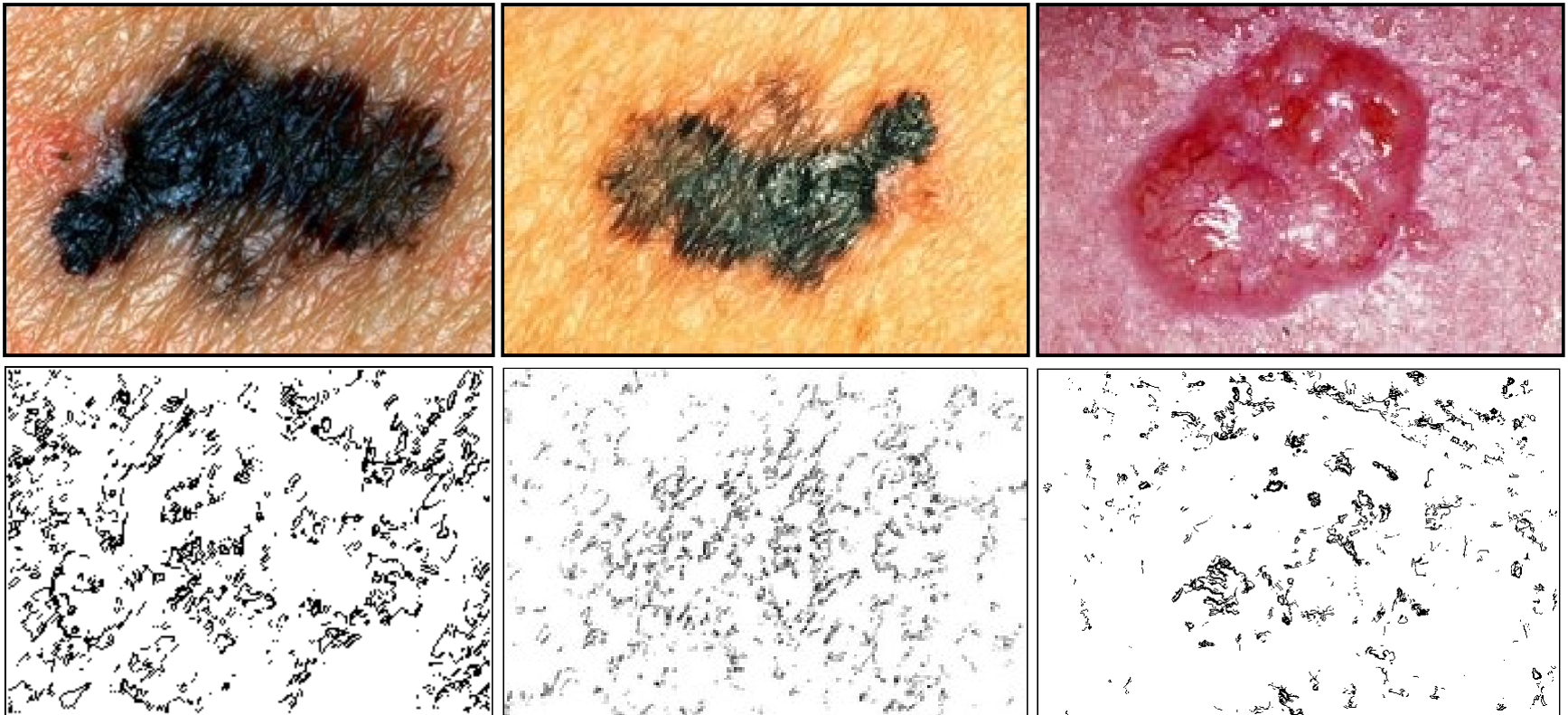
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$$N = 10 \quad L = 40 \quad \mathcal{L} = 40 \quad q_0 = 0.75 \quad \beta = 1 \quad \xi = 0.05 \quad \rho = 0.1 \quad \bar{\eta}_{min} = 0$$

# Skin Images: **Bad**

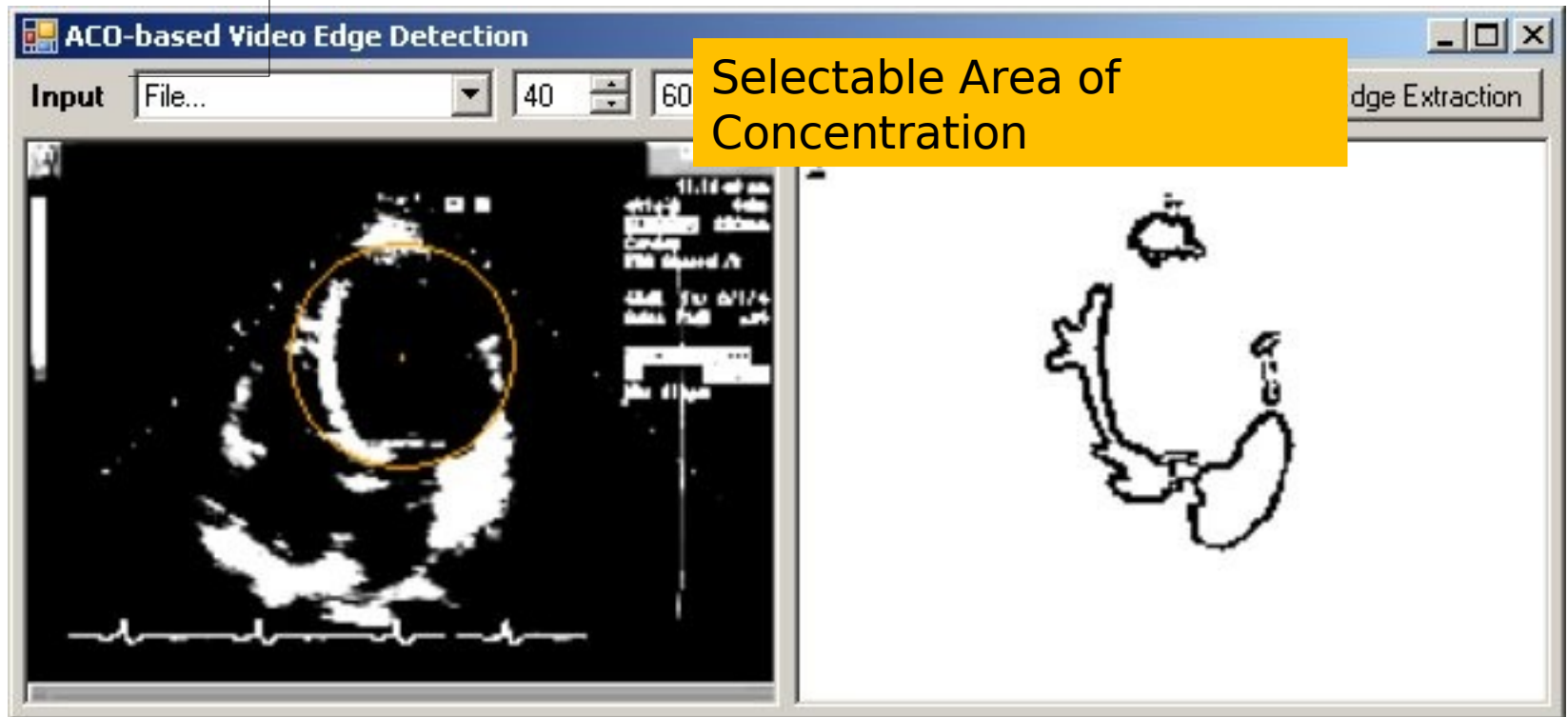
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$N = 10$   $L = 40$   $\mathcal{L} = 40$   $q_0 = 0.75$   $\beta = 1$   $\xi = 0.05$   $\rho = 0.1$   $\bar{\eta}_{\min} = 0$

# Echocardiogram Videos

Heart Wall Detection?



# Conclusions

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- ▶ Better edges can be achieved with pseudorandom proportional rule
- ▶ Parameter  $q_0$  gives additional degree of flexibility
- ▶ Suitable parameter values depend on nature of image
  
- ▶ Future works
  - ▶ Parameters and functions: more tuning
  - ▶ How to increase immunity to noise?
  - ▶ Focus on ACO-based approach to image edge detection in the context of a specific application

# Acknowledgement

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**Thank you.**