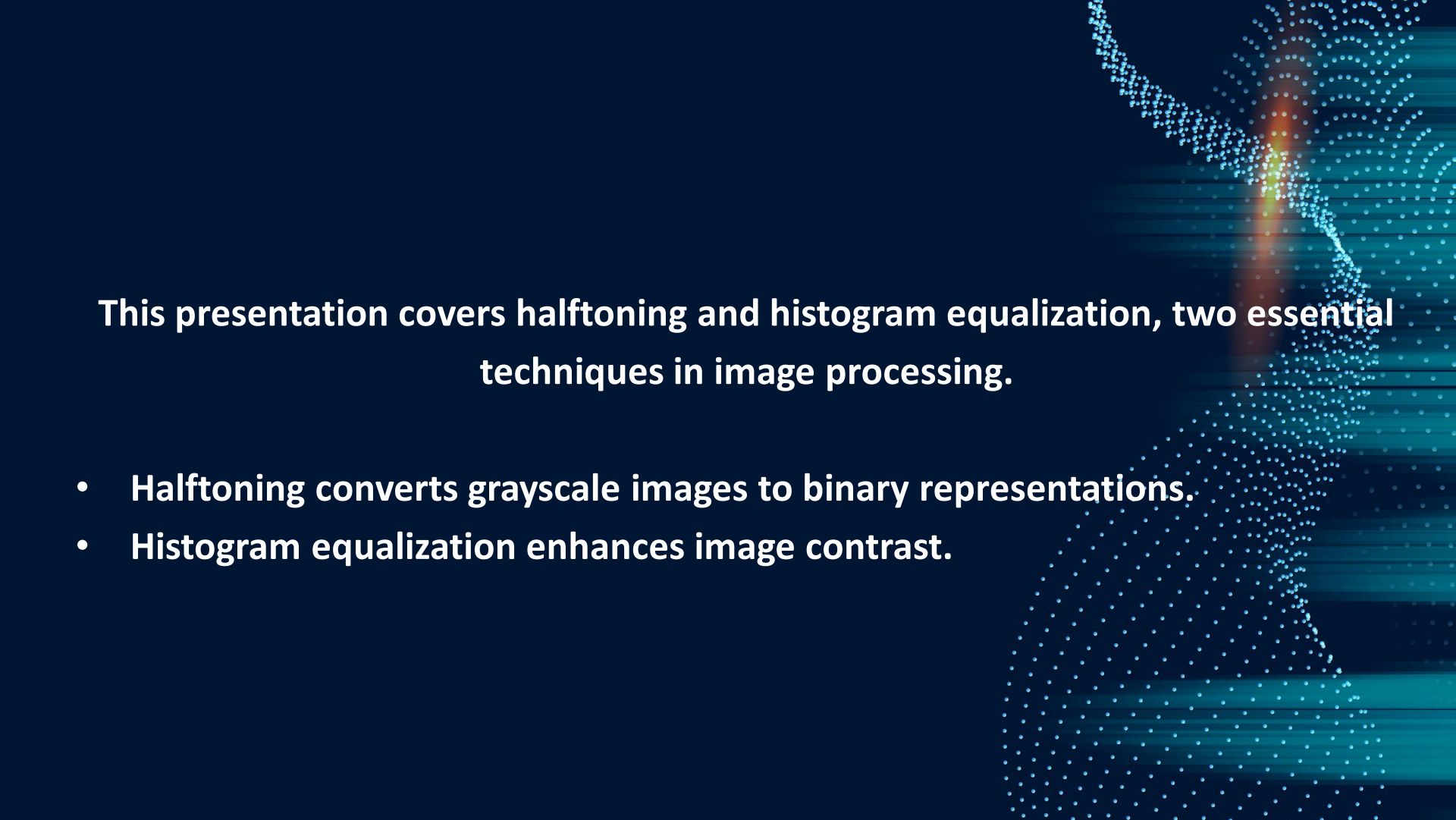


# Halftoning and Histogram Equalization

Image Processing Techniques



**This presentation covers halftoning and histogram equalization, two essential techniques in image processing.**

- **Halftoning converts grayscale images to binary representations.**
- **Histogram equalization enhances image contrast.**

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## Introduction to Halftoning

Halftoning creates the illusion of gray shades using black ink.

It transforms grayscale images into binary (1s and 0s).

The technique uses error-diffusion to approximate gray levels.

# Halftoning Algorithm

Initialization of error arrays.

Loops through image pixels to calculate propagated errors.

Thresholding determines if a pixel is on or off.

# Practical Applications of Halftoning

Produces large text files for wall printing.  
Useful for creating posters from grayscale images.  
Optimizes the appearance of black and white images.





# Histograms

Histograms represent the frequency of gray levels in an image.  
They can indicate scanning quality and contrast.  
Help in selecting thresholds for object detection.

# Histogram Equalization

Enhances image contrast by adjusting intensity distributions.  
Transforms an image to achieve a uniform histogram.  
Effective for increasing visibility in dark or low contrast images.



# Histogram Equalization Algorithm

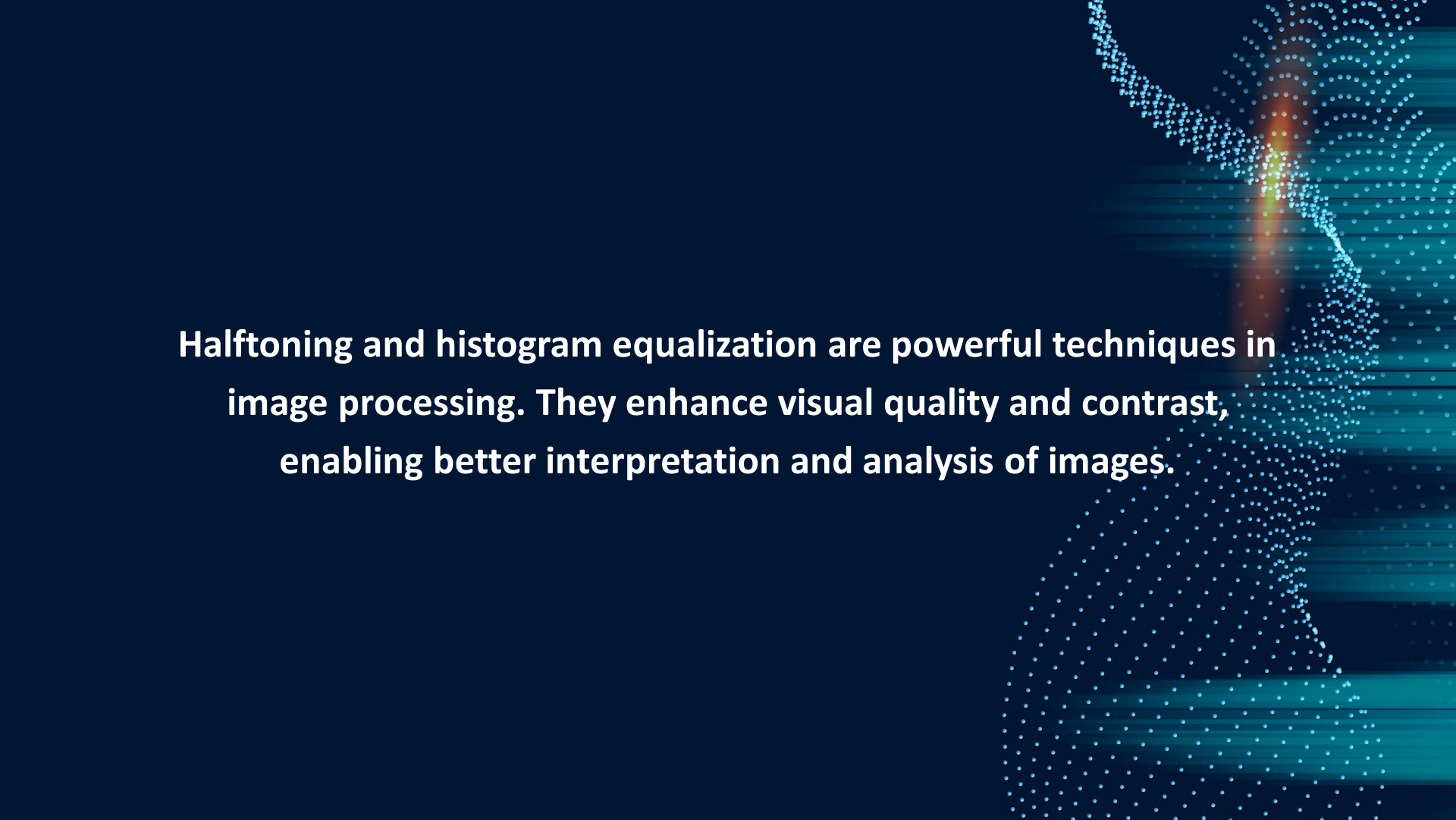
Calculate the histogram of the image.

Compute cumulative distribution and transform pixel values.

Results in an image with improved contrast.

# Results of Histogram Equalization

Some images show significant improvement after equalization.  
Others may introduce noise in previously uniform areas.  
Careful application is required to avoid undesired effects.



**Halftoning and histogram equalization are powerful techniques in image processing. They enhance visual quality and contrast, enabling better interpretation and analysis of images.**

The background is a dark blue gradient. It features abstract, flowing patterns of small white dots that form a sense of motion, particularly on the left and right sides. Bright, diagonal streaks of light in shades of orange and yellow cut across the blue background, adding a dynamic and energetic feel to the overall composition.

**Thank you!**

# References

- Saghri, J. A., Hou, H. S., & Tescher, A. F. (1986). Personal Computer Based Image Processing with Halftoning. *Optical Engineering*, 25(3), 499-504.