

# Image Restoration Using Hopfield Networks

Hopfield networks excel at pattern storage and retrieval. They are effective in associative memory tasks. These networks are used in image restoration and signal processing. They handle noisy or incomplete input data.

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# Problem Background

## 1 Image Corruption

Images degrade due to noise, blurring, or missing data.

## 2 Traditional Methods

Struggle with complex or highly degraded images.

## 3 Hopfield Networks

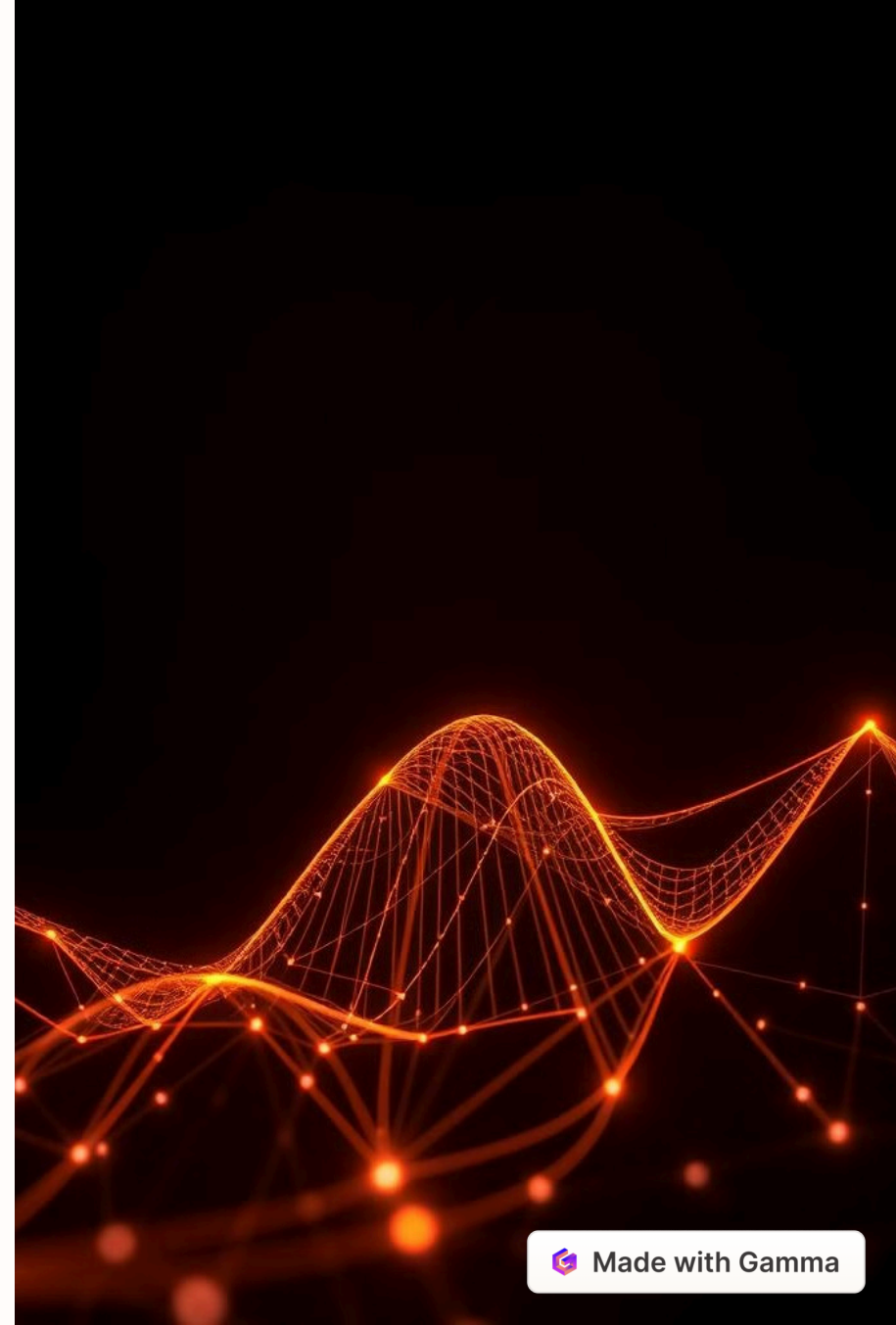
Restore noisy images by minimizing an energy function.



# AI Solution: Energy Function

Hopfield Networks minimize an energy function. This function captures the difference between the corrupted image and the restored version.

The network adjusts pixel values until it reaches a stable state. This represents the closest match to the original image.





# Objectives

## Implement Restoration

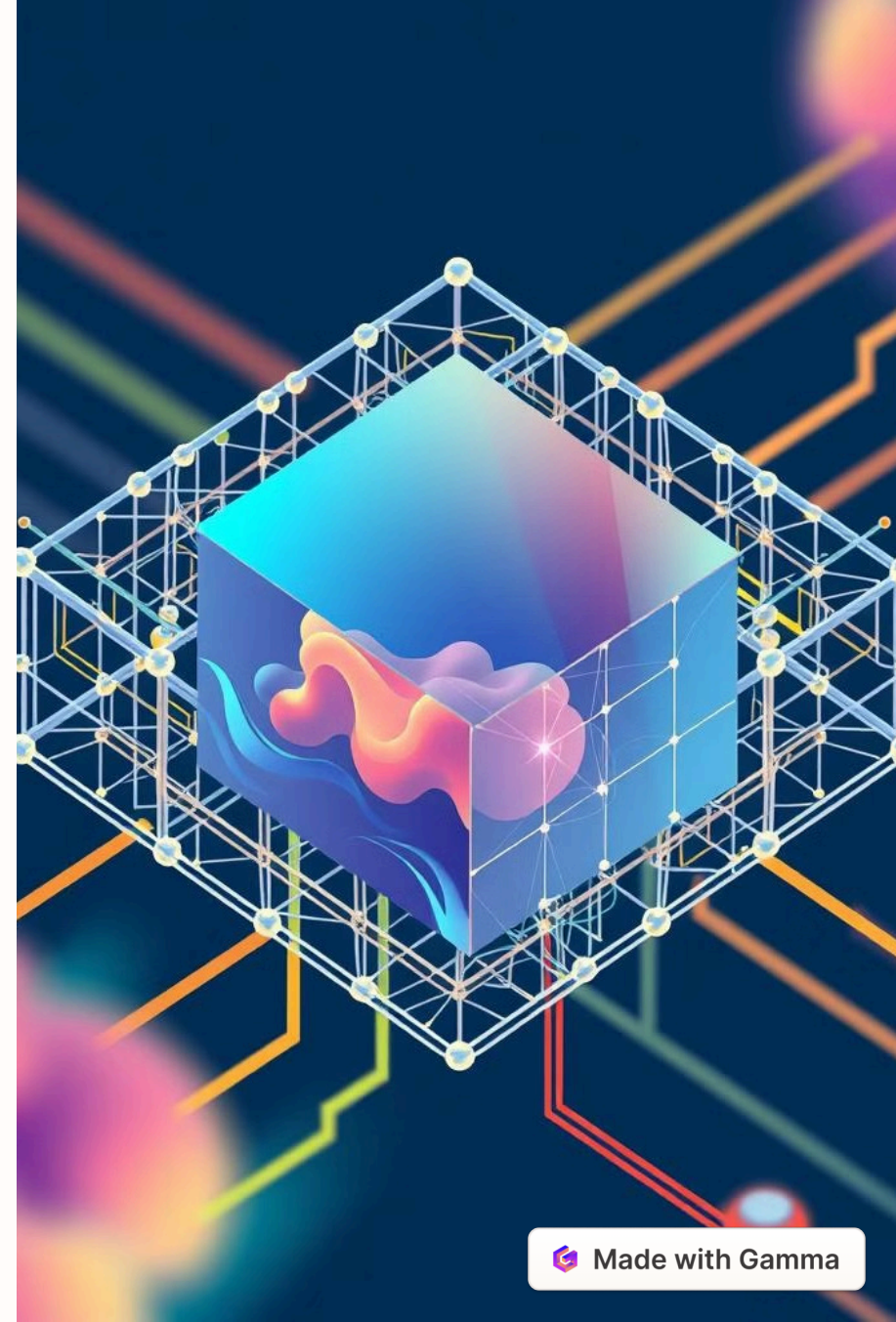
Use Hopfield Networks to minimize energy and recover images.

## Explore Energy Function

Guide the network by capturing differences between images.

## Iterative Updates

Adjust pixel values until a stable state is reached.



# Literature Review

## GANs

Generative Adversarial Networks improve image restoration.

## DNNs

Deep Neural Networks are effective for denoising and deblurring.

## VAEs

Variational Autoencoders use reference images for super-resolution.