# LINEAR ALGEBRA

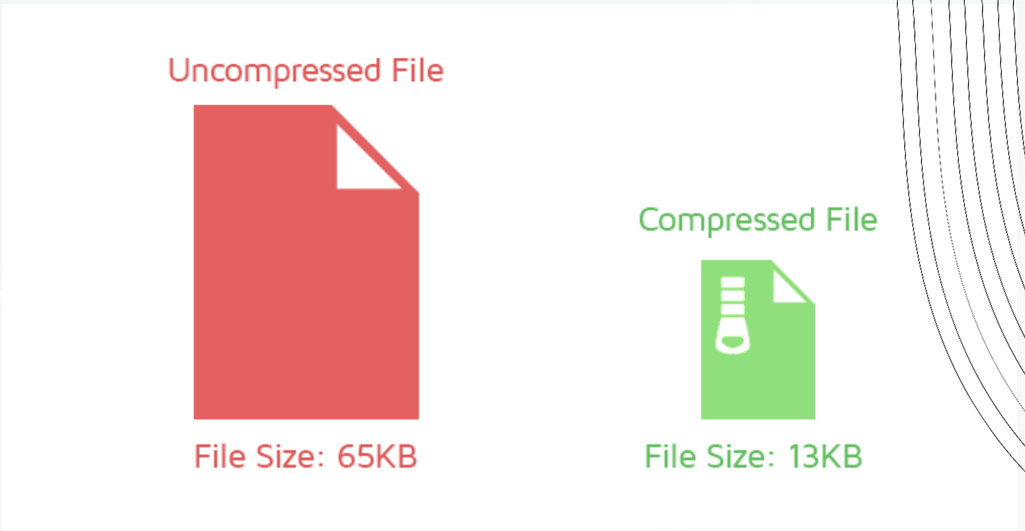
# PROJECT

TEAM 25

# VECTOR QUANTIZATION

- It involves representing a set of data points using a smaller set of representative vectors called codewords or centroids.
- By mapping each data point to its nearest codeword, we can efficiently represent the data with reduced storage requirements.

- Vector Quantization offers advantages such as:
- Data compression
- Data representation
- Pattern recognition



# CODEBOOK GENERATION

The codebook generation step involves finding representative codewords that best represent the data.

Vector Quantization aims to represent data using a set of representative codewords called the codebook. This step focuses on generating the codebook.

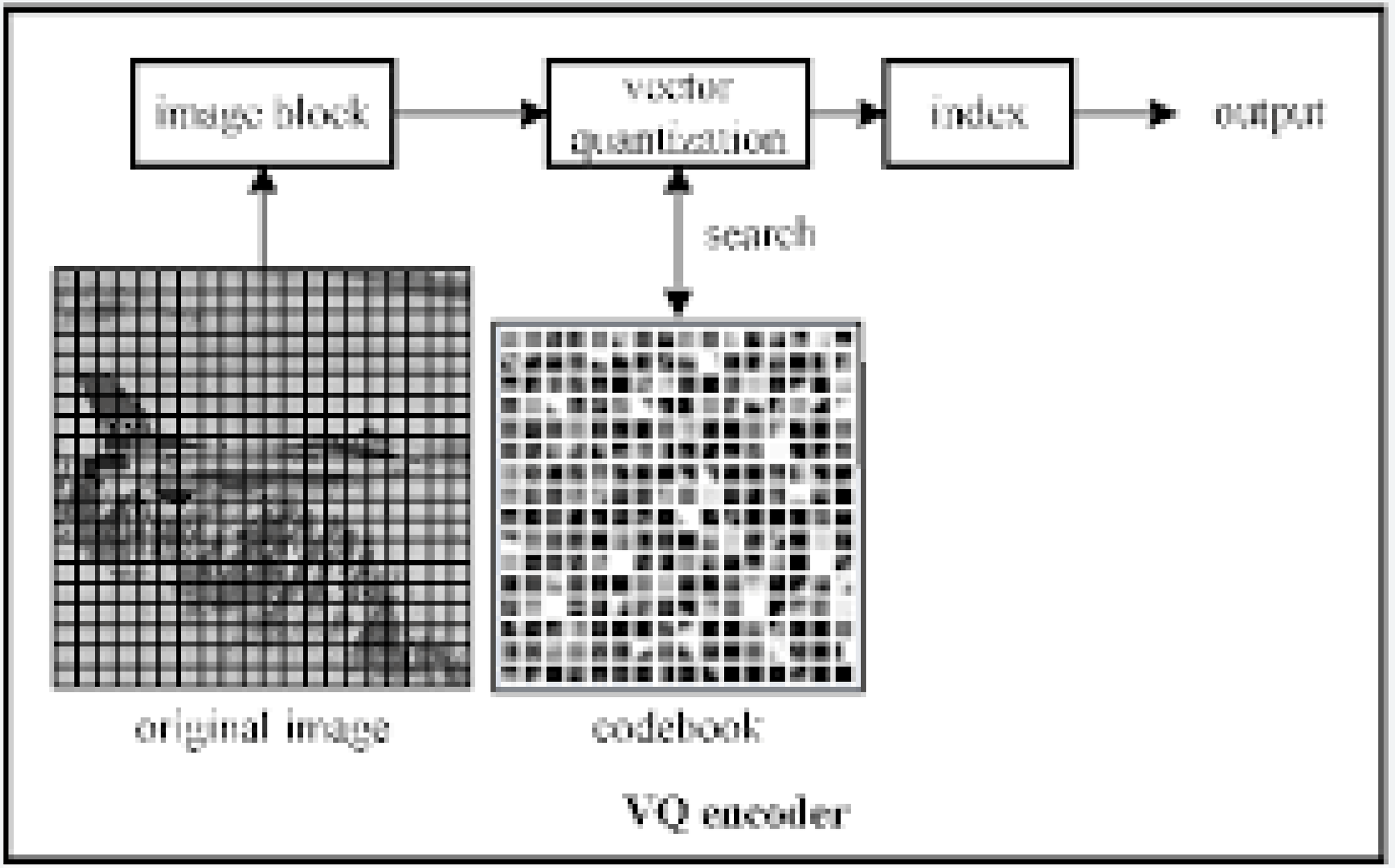


image block
vector quantization
index
output
search
original image
codebook
VQ encoder

# CODEBOOK GENERATION

## Contd .

Use of K-means clustering to generate the codebook.The codebook generation step involves finding representative codewords that best represent the data.

The codebook generation is performed using the Mini-Batch K-means clustering algorithm. It aims to find a set of K codewords that minimize the sum of squared distances between the codewords and the data vectors.

# IMAGE ENCODING

- Assign each block in the image to the nearest codeword in the codebook.
- Once the codebook is generated, each block in the image needs to be assigned to the nearest codeword in the codebook. This step is called image encoding.

Main step in this is to
Calculate the Euclidean distance between each block and the codebook.
To determine the similarity between a block and each codeword in the codebook, the Euclidean distance is calculated. This distance represents the difference between the block and each codeword.

# IMAGE DECODING

Reconstruct the compressed image using the assigned codewords from the codebook.

After the image encoding step, each block in the image is associated with a codeword index.

The image decoding step focuses on reconstructing the compressed image using the assigned codewords.

Using the assigned codeword indices, the corresponding codewords are retrieved from the codebook. Each block is represented by its associated codeword.

# PROCEDURE OF ENCODING AND DECODING

(a) --> ENCODING
(b)--> DECODING