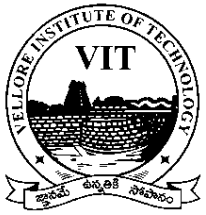


VIT-AP UNIVERSITY

Computer Vision

(Course Code: 4047)

Module 2:Lecture-1: Features

Gundimeda Venugopal, Professor of Practice, SCOPE

What is a feature

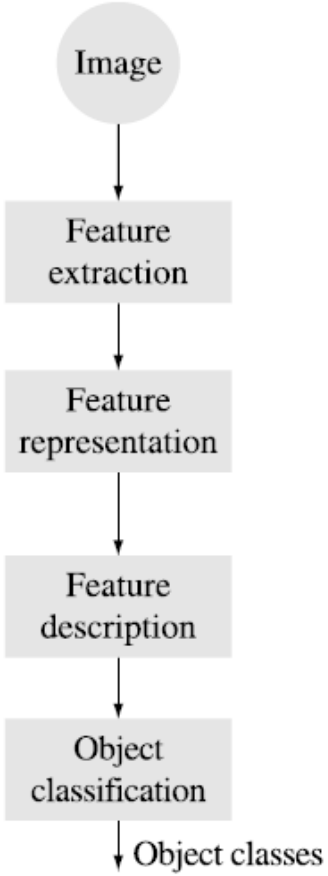
Any characteristic or primitive of an object that helps to distinguish or discriminate an object from other objects is called an image feature.

- Natural features These are visual appearances of the image that are natural to the object, such as brightness and texture.

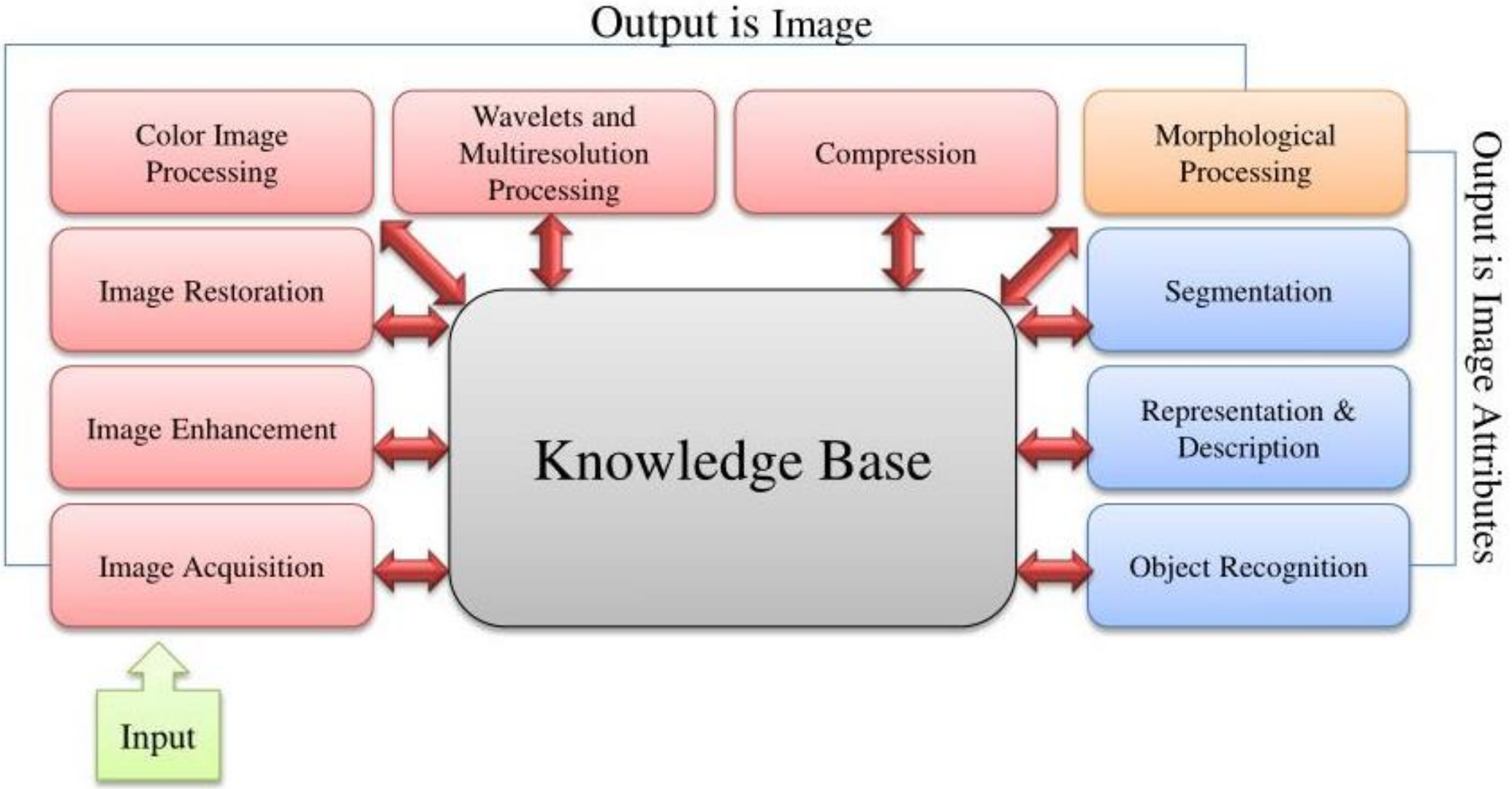
- Artificial features These are derived features that are obtained using image manipulations. Amplitude histograms and frequency spectrums are examples of this category

What is feature extraction

- Feature extraction is a process of extraction and generation of features to assist the task of object classification. This phase is critical because the quality of the features influences the classification task.



Key Stages in Digital Image Processing



Levels of reasoning in vision

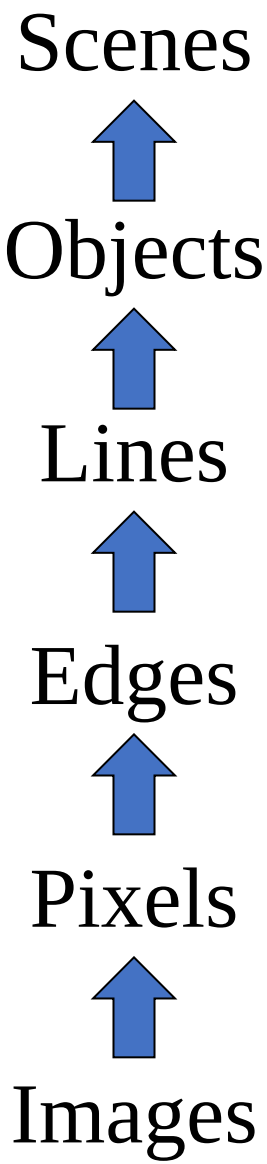
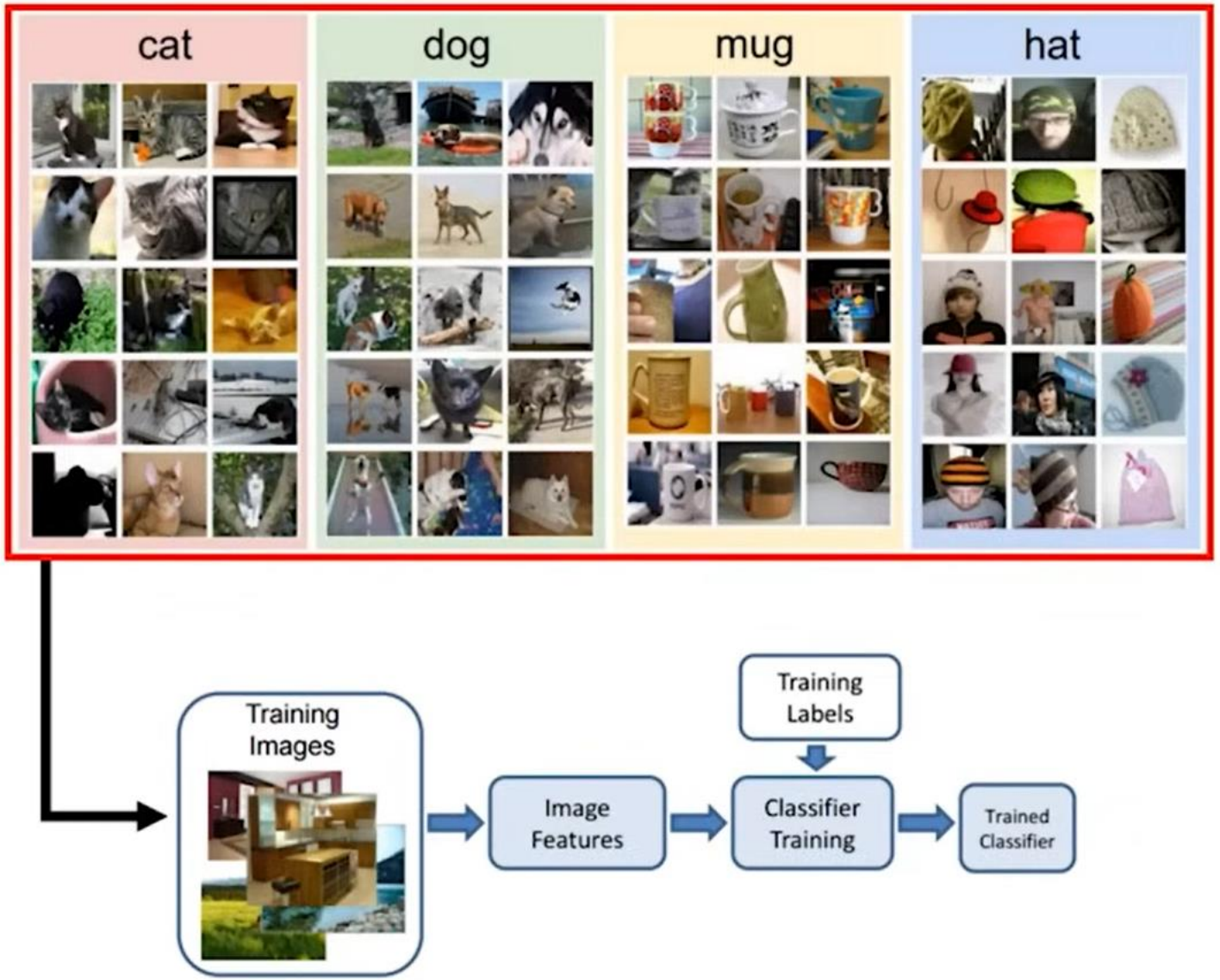


Image Classification Pipeline



Characteristics of a Good Feature

Robustness The property of a feature's invariance to operations such as translation, rotation, and scaling, and properties such as illumination, noise, and artefacts is called robustness. Some of the important types of invariance are as follows:

Shift invariance This is the ability of the feature to remain constant when shift operations are performed.

Rotation invariance This is the ability of the feature to remain constant when rotated.

Size invariance This is the ability of the feature to remain constant when its size is changed.

Mirror, shear, and affine invariance Features that remain constant even if operations such as mirroring, shear, and affine transforms are applied, are mirror invariant, shear invariant, and affine invariant, respectively.

Characteristics of a Good Feature

Occlusion invariance When all or some parts of the object are hidden, the property of the features that do not change is said to be occlusion invariant.

Discrimination The properties should distinguish one object from the other and there should be no overlapping features.

Reliability The values should be reliable, that is, similar objects should have similar values.

Independence The features are said to be independent if they are statistically uncorrelated from each other. In other words, change in one feature value does not affect the values of the other features.

Resistance to noise A good feature should be immune (resistant) to noise, artefacts, etc.

Compactness The features should be in small numbers so that they can be represented compactly.

Classification of Features