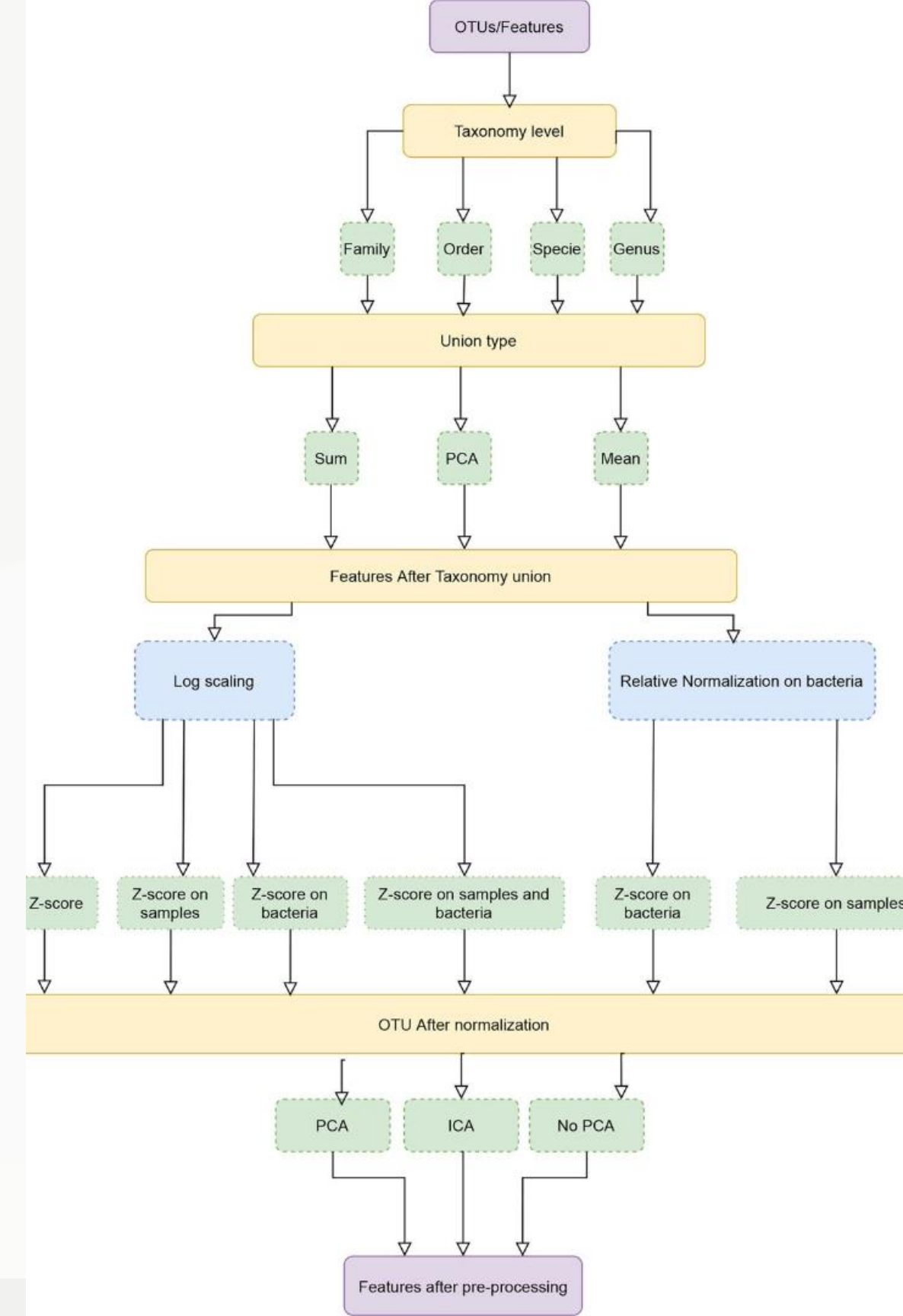# Basics Of Image Pre-Processing

Image pre-processing is a crucial step in computer vision. It involves manipulating digital images to improve their quality or extract useful information. From noise reduction to contrast enhancement, pre-processing plays a vital role in preparing images for further analysis.

NAME : ABHINAY KUMAR
ROLL NO   :   13000121014

Paper Name: Pattern Recognition
Paper Code:PEC-IT602D
CSE,6thSem(2021-2025),CA-1

Importance of Image Pre-Processing in Computer Vision

1 Enhanced Feature Extraction

Pre-processing techniques enhance the extraction of important features from images, leading to more accurate computer vision models.

2 Noise Mitigation

By reducing noise and unwanted artifacts, pre-processing ensures that models can focus on relevant information within images.

3 Improved Model Performance

Well-processed images lead to better model performance, accuracy, and robustness in computer vision applications.

Common Techniques Used in Image Pre-Processing

Image Resizing and Scaling

Resizing and scaling allow images to be standardized, ensuring compatibility for various computer vision algorithms.

Image Denoising and Smoothing

Denoising techniques remove unwanted noise while smoothing enhances the visual quality of images.

Image Enhancement and Contrast Adjustment

Enhancement techniques improve the clarity and contrast of images, making features more distinguishable.

Image Resizing and Scaling

| 1 | 2 | 3 |

Analyze Image Dimensions

Determine the current dimensions and resolution of the image before resizing or scaling.

Choose Appropriate Algorithm

Select the best method for resizing, such as bilinear interpolation or nearest-neighbor interpolation.

Apply the Transformation Transformation

Utilize the chosen algorithm to uniformly resize or scale the image as per the requirements.

Image Denoising and Smoothing

1 — Noise Reduction

Utilize filters like Gaussian, median, or bilateral filters to reduce noise in the image.

2 — Edge Preservation

Apply smoothing techniques while preserving edges to enhance visual quality without sacrificing important details.

Image Enhancement and Contrast Adjustment

Contrast Stretching

Expanding the range of intensity values to fully utilize the available brightness levels in an image.

Histogram Equalization

Restructuring the intensity distribution in an image to improve contrast and enhance details.

Gamma Correction

Adjusting brightness and contrast by modifying gamma values to achieve optimal visual appearance.

Image Normalization and Standardization

1

Data Centring

Calculating and adjusting the mean pixel value for each color channel to be zero.

2

Data Scaling

Scaling the pixel values to have unit variance or a specific range to ensure consistency.

Conclusion and Key Takeaways

Image Pre-Processing	Plays a critical role in preparing images for computer vision models.
Techniques	Resizing, denoising, enhancement, and normalization are fundamental techniques with wide applications.
Impact	Well-preprocessed images significantly contribute to the accuracy and reliability of computer vision systems.

References:

https://www.mygreatlearning.com/blog/introduction-to-image-pre-processing/

https://blog.roboflow.com/why-preprocess-augment/

Thank You