LUND UNIVERSITY

Module 4: Analyzing image content with computer vision

Lesson 4.1: Computer vision (CV) in social science

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Functions of Visuals in Sustainability Communication

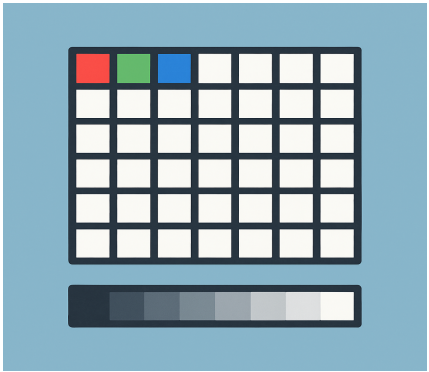
- Visuals clarify sustainability messages
- Photos drive empathy and action
- Infographics simplify complex data
- Videos show immersive impact
- Visual variety reinforces messages

Computer Vision Areas and Content Challenges

- CV spans detection recognition
- Lighting and angles challenge accuracy
- Monitoring tracks natural features
- Diverse sources demand robust data
- CV tracks environmental change

Image Basics: Pixels, RGB, and Grayscale

- Images comprise pixel values
- RGB channels blend colors
- Grayscale simplifies tonal detail
- Channels store 0-255 intensities
- Basics enable image analysis



Constructing and Manipulating Images with NumPy

- Images map to NumPy matrices
- Matrix cells match pixel values
- Adjusting values shifts brightness
- Edits highlight key regions
- NumPy enables flexible preprocessing

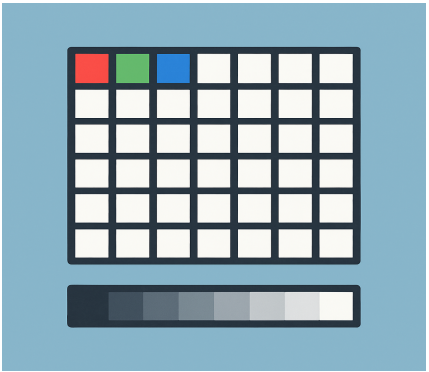
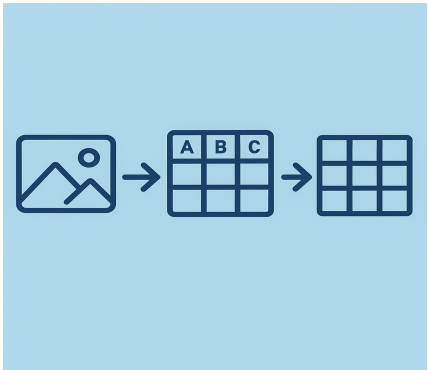


Image Features: Colors, Histograms, and Edges

- Features help models spot patterns
- Color histograms show dominant tones
- Edge detection outlines shapes
- Texture features distinguish surfaces
- Features boost AI interpretation

Reading Images into Dataframes and Matrix Structures

- OpenCV imports images as matrices
- Dataframes organize pixel data
- Matrices retain spatial structure
- Structured data simplifies comparisons
- Pixel-level access improves precision



Normalizing Image Content: Resize and Grayscale

- Normalization boosts model performance
- Resizing enforces uniform dimensions
- Grayscale reduces visual complexity
- Brightness tweaks maintain consistency
- Normalization supports reliable results