FACIAL EXPRESSION CLASSIFICATION USING CNN

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RESEARCH QUESTION & TITLE

Can we accurately classify facial expressions into seven emotions (angry, disgust, fear, happy, neutral, sad, surprise) using a image dataset and a CNN?

Emotion Detection from Facial Images Using CNN: A Multi-Class Classification

DATASET DESCRIPTION

Source

- Provided by module leader

Number of Classes

- 7 (angry, disgust, fear, happy, neutral, sad, surprise)

Total Images

- 35,887

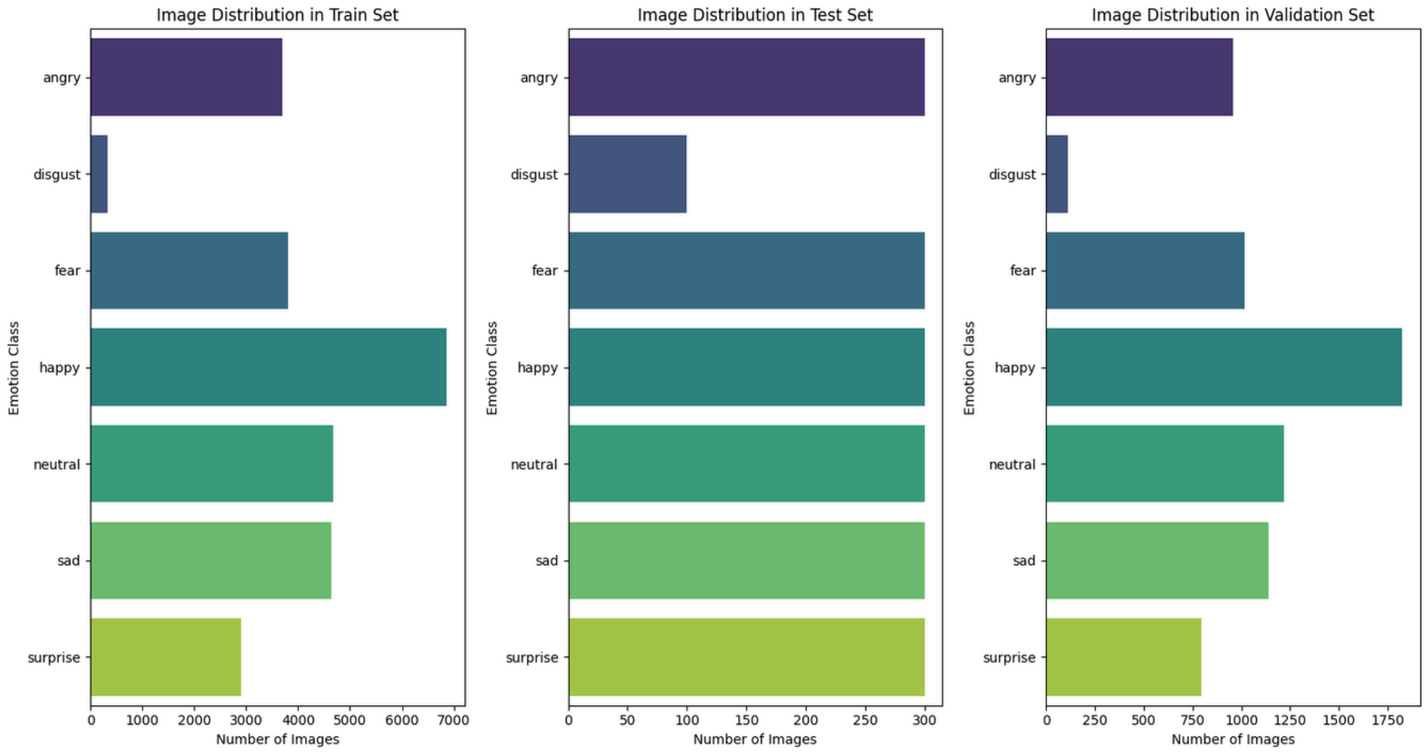
Splits

- **Train**: 26,921 images
- **Validation**: 7,066 images
- **Test**: 1,900 images

Challenges

- Imbalanced classes (e.g., disgust has significantly fewer images)
- Variations in image quality,
- Difficulty in distinguishing between fear and surprise during label verification

DATASET STATISTICS



Distribution of Images Across Classes

Bar plots showing the number of images per class for each split

- Train: happy (6,864), disgust (336) – significant imbalance
- Validation: happy (1,825), disgust (111)
- Test: balanced at 300 images per class

Key Insight

The train and validation sets show class imbalance (e.g., disgust is underrepresented), which may affect CNN performance. The test set is balanced.

DATASET VISUALIZATION

OVERVIEW

Display sample images from 3 classes (happy, sad, angry)

SAMPLE IMAGES

Images are 48x48 pixels, showing clear facial expressions. Variations in lighting and pixelation may require preprocessing (e.g., normalization).

Summary and Next Steps

Summary:

- Dataset consists of 35,887 images across 7 classes, split into train (26,921), validation (7,066), and test (1,900) sets.
- Distribution shows significant imbalance in train and validation sets (e.g., disgust has only 336 images in train).
- Sample images indicate low resolution (48x48 pixels), suggesting preprocessing needs.

Next Steps:

- Preprocess images: resize (if needed), normalize pixel values, and apply data augmentation to address class imbalance.
- Train a CNN model to classify facial expressions and evaluate performance on the balanced test set.
- Address class imbalance (e.g., oversampling disgust, using weighted loss functions).

Thank you