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DIAGNOSTICS OF CHILDREN'S EMOTIONAL STATE BASED ON INTELLECTUAL MULTIMODAL ANALYSIS OF DRAWINGS

Abstract. The emotional state of a child is a complex, multidimensional construct, reflected in the choice of color, composition, symbolic images, and strokes in the drawing, which is formed through a non-linear, chaotic creative process. Traditional psychological analysis of children's drawings relies on subjective interpretation and is not scalable for mass screening. This paper proposes a neural network multimodal hybrid model for automated emotion diagnostics, combining four complementary feature channels. The pre-trained EfficientNet-B3 neural network extracts the global context of the image; the YOLOv8 neural network determines local semantically significant objects, expanded to 55 classes on the open ESRA dataset; the color palette is described by the statistics of the HSV (Hue, Saturation, Value) space; compositional and graphic metrics encode the geometry and character of the lines. For adaptive weighting of channel contributions, a lightweight attention-fusion layer is introduced, forming a 256-dimensional combined feature vector. The final classifier based on a multilayer perceptron (MLP) matches a drawing to one of three emotional categories - "Happiness", "Anxiety/Depression", "Anger/Aggression", achieving an accuracy of 80-85% on a combined test set from Kaggle. A key benefit is the interpretable JSON report, which contains class probabilities and numerical indicators of color, composition, and detected objects. This makes the results easier to use in practice by a psychologist and increases confidence in the model.

Keywords: children's drawings, emotional state, diagnostics, neural network, multimodal model, EfficientNet-B3, YOLOv8, attention f