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**Weekly Report**

Comparative Analysis of Image Classification Models for Efficient and Accurate Classification across Diverse Image Types

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# Measurement

Considering the fact that the current research project is related to classification models, it falls under the nominal measurement type. Moreover, accuracy, recall and precision will be used to access different classification models on data with different noise levels and degree of rotation. Nominal measurements are characterized by values that identify attributes uniquely, where the values are non-ordered. In the case of classification metrics like accuracy, precision, and recall, the values represent different categories or classes, such as "true positive," "true negative," "false positive," and "false negative." These categories are discrete and do not have an inherent order or magnitude. Accuracy, which is ration of correct classification to the total number of samples will be used as main metric. However, recall and precision will be also used for several reasons:

1. Class Imbalance: When the distribution of classes is imbalanced, accuracy alone can be misleading. Recall focuses on capturing the instances of the minority class, making it useful in imbalanced scenarios.
2. Asymmetric Costs: Misclassifying instances of one class may have more severe consequences than misclassifying instances of another class. Precision measures the model's ability to avoid false positive predictions, which is important when the cost of false positives is high.
3. Trade-off between Recall and Precision: Increasing recall often decreases precision and vice versa. Evaluating both metrics allows for a comprehensive understanding of the model's performance and the trade-off between capturing all positive instances and avoiding false positives.

To calculate recall and precision for image classification with 15 classes, the following steps will be made:

True Positives (TP): The number of images that were correctly classified as belonging to each class should be counted. False Positives (FP): The number of images that were incorrectly classified as belonging to each class should be counted. False Negatives (FN): The number of images that were incorrectly classified as not belonging to each class should be counted. True Negatives (TN): The number of instances that were correctly classified as not belonging to the specific class should be counted.

Once TP, FP, FN, and TN values have been calculated for each class, recall and precision finally can be calculated as follows:

Recall measures the proportion of actual positive instances that are correctly identified. It is calculated as the ratio of true positives to the sum of true positives and false negatives for a specific class.

Recall = TP / (TP + FN)

Precision measures the proportion of instances that are correctly classified as positive out of all instances that are classified as positive. It is calculated as the ratio of true positives to the sum of true positives and false positives for a specific class.

Precision = TP / (TP + FP)