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Quiz-2

CSE 414: Research and Innovation

Time-45 mins. Marks: 15

A research team is developing a new Image Tampering Detection and Localization Method to detect tampered images and accurately locate manipulated regions. Existing methods have limitations and require a trade-off between Precision and Recall. The researchers review existing literature, identify limitations, and design an improved method using image processing, computational techniques, and mathematical/statistical analysis.

The proposed method is tested on benchmark datasets using different parameter settings and compared with existing methods using a confusion matrix, Precision, Recall, F1-Score, Accuracy, and IoU. The researchers critically analyze the results and consider the trade-offs among different metrics to select the most appropriate method. The system may be used in digital forensics and digital-evidence verification, where inaccurate results could have significant legal and societal consequences.

Now answer the following questions

1. (10)

a) Identify the relevant **CEP characteristics** and justify each selection using evidence from the scenario.

b) Identify the relevant **CEA characteristics** and justify each selection using evidence from the scenario.

c) Identify the relevant **Knowledge Profile (KP) elements** and explain how each selected knowledge area is required in the research.

2. (5)

A research team has developed a new **Image Tampering Detection and Localization Method**. The proposed method is compared with three existing methods. The objective of the research is to **detect tampered images correctly and accurately identify the tampered regions while minimizing both false alarms and missed tampered regions**.

Method	Precision (%)	Recall (%)	F1-Score (%)	Accuracy (%)	IoU (%)
Method A	96	72	82	91	71
Method B	89	91	90	88	79
Method C	93	86	89	96	81
Proposed Method	92	90	90	90	90

Write a critical **result discussion** of the experiment. Based on the comparative results, explain whether the Proposed Method should be considered the best method for this research problem. Your discussion must consider **metric trade-offs rather than simply selecting the method with the highest score.**