JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 1 EXAMINATION - 2025

B.Tech. - VI Semester (CSE/IT)

COURSE CODE (CREDITS): 18B1WCI634 (2) MAX. MARKS: 15

COURSE NAME: Machine Learning

COURSE INSTRUCTORS: D. Gupta, Monika, M. Dhalaria, V. Sehgal MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems. (c) Use of calculator is allowed. (d) Be concise.*

<table>
<tr><th>Q. No.</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q1(a)</td><td>What are the main challenges encountered in developing machine learning applications? Discuss the key difficulties and their potential solutions.</td><td>1</td><td>2</td></tr>
<tr><td>(b)</td><td>What are the fundamental differences between supervised, unsupervised, and reinforcement learning in terms of their objectives, data requirements, and real-world applications?</td><td>1</td><td>3</td></tr>
<tr><td>Q2 (a)</td><td>A machine learning model predicts animals, Cat, Dog and Rabbit on the basis of their behavior. Using the following confusion matrix, compute Recall, Accuracy and Precision for Cat class:
Predicted
<table>
<tr><th></th><th></th><th>Cat</th><th>Dog</th><th>Rabbit</th></tr>
<tr><td rowspan="3">Actual</td><td>Cat</td><td>10</td><td>2</td><td>1</td></tr>
<tr><td>Dog</td><td>1</td><td>8</td><td>1</td></tr>
<tr><td>Rabbit</td><td>2</td><td>1</td><td>9</td></tr>
</table></td><td>3</td><td>3</td></tr>
<tr><td>(b)</td><td>What is ROC AUC (receiver operating characteristic area under curve) and why is it considered a useful metric for evaluating classification models, especially for imbalanced datasets?</td><td>3</td><td>2</td></tr>
<tr><td>Q3 (a)</td><td>In linear regression, what is the total sum of residuals for a given dataset? Additionally, derive the formulas for the regression coefficients β_0 (intercept) and β_1 (slope) by minimizing the sum of squared residuals.</td><td>2</td><td>3</td></tr>
<tr><td>(b)</td><td>What is gradient descent? Outline the step-by-step process for finding the local minimum of a differentiable function in the case of a regression line.</td><td>2</td><td>2</td></tr>
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