

Final Questions for the Subject "Pattern Recognition"

(For 4th-year students of the Faculty of Information Technology, TUIT)

1. Describe recognition algorithms based on score calculations. How do they work, and where are they applied?
2. How many types of scanners are used for fingerprint recognition, and how do they function?
3. What is the role of Bayes' method in classification and recognition tasks?
4. Define the term "feature" in the context of pattern recognition systems.
5. Are the terms "feature," "class," "object," and "pattern" synonyms? Explain their differences or similarities.
6. How is feature space formed? Provide a concrete example.
7. What is the purpose of feature space reduction, and why is it important?
8. How is a pattern's membership in a specific class determined based on its feature vector?
9. In what alphabets can features be represented? Explain their characteristics.
10. Provide an example of features in a nominal space and describe their usage.
11. How is the task of matching a given instance to a specific pattern solved?
12. What are biometric recognition systems, and what technologies do they use?
13. What classification features can be used to identify homogeneous objects?
14. How can a set of characteristics belonging to one object be determined?
15. Explain the principle of an elementary logical classifier.
16. Describe the basic principles of how FineReader works for text recognition.
17. How is pixel comparison of 2D images performed in recognition tasks?
18. What are systems called that use human biometric data for recognition?
19. Provide an example of an online database for recognition and explain its use.
20. Which systems are designed to capture images from a camera and convert them into symbolic descriptions?
21. List the steps in solving a clustering problem and explain their essence.
22. Define the clustering task and its role in pattern recognition.
23. What is meant by the compactness hypothesis in clustering tasks?
24. How do multilayer neural networks work, and what are they used for?
25. Explain the k-nearest neighbors method, its features, and applications.
26. What technologies are used in machine vision systems, and what are their characteristics?
27. What machine learning libraries do you know? Describe their functionality and applications.
28. Name programs used for text recognition and characterize them.
29. What do you know about metrics in classification and recognition tasks? Provide examples.
30. What is a subset of important features, and how is it used in data analysis?
31. Describe the naive Bayes method and explain in which cases it is applied.
32. What does the term "validation dataset" mean in machine learning?
33. What neural network libraries do you know, and what can you say about them?
34. What is the main purpose of applying neural networks in recognition tasks?
35. What neural network models exist, and what are their features?
36. What are speech technologies, and where are they applied?
37. What are the main challenges in converting speech to text?
38. What does supervised learning mean, and what is its essence?
39. What does unsupervised learning mean, and how is it implemented?
40. How is a training dataset for machine learning formed?
41. In what form is a training dataset represented — as a table, array, or another structure?
42. Explain what is meant by the term "training dataset."
43. How can the quality of a training dataset be verified?
44. What do you understand by the term "object" in classification tasks?

45. Are there differences between the concepts of "object" and "pattern"? Explain.
46. What metrics can be used to compare object features? Provide examples.
47. How are combinatorial methods used for analyzing object similarity? How are they grouped?
48. Describe the process of object classification. What steps does it include?
49. What is the table describing object characteristics called, and how is it compiled?
50. What is the domain of an object? Provide examples.
51. What are OCR (optical character recognition) systems, and how do they work? Provide examples.
52. How do simple neural networks differ from complex ones, and in what tasks are they used?
53. What is meant by the unsupervised recognition task? Explain its features.
54. What are the main problems associated with supervised learning in machine learning?
55. What is a precedent in the context of pattern recognition? Provide an example.
56. How is the task of recognition solved based on multiple precedents?
57. What modern recognition systems do you know, and what technologies do they use?
58. What is a partial precedent, and how is it used in data analysis tasks?
59. How is a color image converted to binary, and why is this necessary?
60. What biometric characteristics of a person are considered most informative for identity recognition?
61. Can the terms "class," "cluster," and "taxon" be considered synonyms? Explain the differences between them.
62. How is the relationship between classes determined in classification tasks?
63. What is the classification process, and what steps does it include?
64. What is the difference between classification and clustering? Provide examples.
65. Describe the history of theoretical foundations of artificial neural networks.
66. How is the process of segmenting an image into separate parts carried out in recognition tasks?
67. What are deterministic recognition methods, and when are they applied?
68. What recognition algorithms do you know, and what are their key features?
69. Explain what statistical recognition methods are and where they are used.
70. How are informative features selected for object classification?
71. List the main stages of the object recognition process in an image.
72. What technical devices are used for image recognition? Provide examples.
73. How do recognition systems work with images obtained from cameras?
74. How is the task of cleaning images from noise solved, and what methods are used?
75. Why is the concept of precedent important in pattern recognition tasks?
76. What scientific disciplines are closely related to pattern recognition, and what do they study?
77. What is the basis for object classification in pattern recognition systems?
78. How is a decision-making rule formed in pattern recognition, and what are its features?
79. What tasks are solved within the scope of pattern recognition? Provide examples.
80. What does the discipline "Pattern Recognition Systems" study, and what are its main objectives?
81. What is a perceptron in pattern recognition systems, and how does it work?
82. How is a decision-making rule structured in pattern recognition systems?
83. Are statistical methods or methods of logical algebra used in pattern recognition systems? Provide examples.
84. What types of neural networks exist in pattern recognition systems — artificial or natural, and how do they work?
85. Name the main areas of application for pattern recognition systems.
86. What functional tasks are solved by pattern recognition systems?

87. What libraries are used in modern pattern recognition systems? Provide examples, such as TensorFlow, OpenCV, and FaceNet.
88. What is the primary goal of pattern recognition?
89. What intelligent systems involve pattern recognition tasks?
90. What is the task of converting speech to text, and what challenges arise?
91. What modern recognition technologies exist, and what are their features?
92. What is the difference between a set and a metric space in the context of recognition?
93. In which fields are voice recognition systems applied, and how do they work?
94. How is pattern recognition carried out in machine learning systems?
95. How do the concepts of a set and a metric space differ in recognition theory?
96. In what areas are voice recognition systems used?
97. What is the FaceNet library, and where is it used?
98. What are the features of the OpenCV library, and what tasks is it applied to?
99. What is TensorFlow used for, and how is it related to recognition tasks?
100. What modern recognition technologies and libraries do you know, and what are their main advantages?

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