Short Questions

1. What is segmentation by clustering, and how does it differ from other segmentation techniques?
2. Explain the concept of grouping and Gestalt principles in human vision.
3. How are shot boundaries detected using segmentation techniques?
4. Describe the process of background subtraction in image processing.
5. What role does clustering play in segmenting pixels in an image?
6. Discuss the application of clustering in image segmentation.
7. How does human vision group elements in an image?
8. Explain the significance of Gestalt principles in visual perception.
9. What are the challenges in shot boundary detection using segmentation?
10. How does background subtraction aid in object detection?
11. Describe the process of clustering pixels based on similarity.
12. What are the advantages of using clustering for image segmentation?
13. How does human perception influence the effectiveness of segmentation by clustering?
14. Discuss the limitations of Gestalt principles in complex scenes.
15. What are the practical applications of shot boundary detection?
16. Explain the algorithmic approach to background subtraction.
17. How does clustering aid in partitioning an image into meaningful regions?
18. Describe the graph-theoretic approach to segmentation by clustering.
19. What are the advantages of using graph theory in image segmentation?
20. Discuss the role of clustering algorithms in segmenting images with varying complexity.
21. How do Gestalt principles contribute to the understanding of image segmentation?
22. Explain the process of shot boundary detection in video processing.
23. What techniques are used for background modeling in background subtraction?

24. Describe the steps involved in segmenting images using graph-theoretic clustering.

25. How can segmentation by clustering be adapted for different types of images and applications?

26. What is segmentation by fitting a model, and how does it utilize the Hough Transform?

27. How is the Hough Transform used for fitting lines in image processing?

28. Describe the process of fitting curves using segmentation techniques.

29. Explain how fitting can be formulated as a probabilistic inference problem.

30. What is the concept of robustness in segmentation by fitting a model?

31. What are the fundamental elements of analytical Euclidean geometry in geometric camera models?

32. Discuss the significance of camera parameters in perspective projection.

33. How do affine cameras and affine projection equations differ from perspective projection?

34. Explain the process of geometric camera calibration using least-squares parameter estimation.

35. Describe the linear approach to camera calibration and its advantages.

36. How is radial distortion accounted for in geometric camera calibration?

37. What is analytical photogrammetry, and how is it applied in camera calibration?

38. Provide an example of an application of mobile robot localization using camera calibration techniques.

39. How does the Hough Transform contribute to line detection in images?

40. Discuss the challenges associated with fitting curves in noisy image data.

41. Explain the role of probabilistic inference in robust model fitting.

42. How do geometric camera models aid in understanding the relationship between 3D scenes and 2D images?

43. Describe the parameters involved in perspective projection and their effects

on image formation.

44. What advantages do affine cameras offer in certain imaging scenarios?

45. Discuss the importance of least-squares parameter estimation in camera calibration.

46. How does radial distortion affect the accuracy of camera calibration?

47. Explain the principles of analytical photogrammetry and its applications.

48. Describe how mobile robot localization can benefit from accurate camera calibration.

49. What techniques are used for fitting curves to image data using the Hough Transform?

50. How can geometric camera models be extended to handle non-linear distortions?

51. Discuss the role of camera parameters in determining image perspective.

52. What mathematical principles underlie affine projection equations?

53. Explain how least-squares parameter estimation optimizes camera calibration.

54. How is radial distortion quantified and corrected in camera calibration?

55. Describe the workflow of applying analytical photogrammetry to camera calibration.

56. What challenges arise in mobile robot localization that can be addressed through camera calibration?

57. How does the Hough Transform detect lines in images with varying orientations and noise levels?

58. Discuss the trade-offs between different curve-fitting algorithms in image processing.

59. What are some common probabilistic models used in fitting image data?

60. Explain how geometric camera models are utilized in computer graphics rendering.

61. How do camera parameters affect the distortion of images in perspective

projection?

62. Compare and contrast affine cameras with perspective cameras in terms of their projection properties.

63. What optimization techniques are employed in least-squares parameter estimation for camera calibration?

64. How does radial distortion correction improve the accuracy of camera calibration?

65. Describe a real-world application where analytical photogrammetry is crucial for camera calibration.

66. How does camera calibration contribute to the accuracy of mobile robot localization algorithms?

67. Discuss the computational complexity of the Hough Transform in line detection.

68. What strategies can be employed to handle outliers in curve fitting algorithms?

69. Explain the Bayesian approach to probabilistic inference in model fitting.

70. How are geometric camera models utilized in virtual reality applications?

71. What are the primary sources of error in perspective projection due to camera parameters?

72. Describe the mathematical formulation of affine projection equations.

73. How does the choice of calibration targets affect the accuracy of camera calibration using least-squares estimation?

74. Discuss techniques for modeling and correcting radial distortion in camera calibration.

75. Explain how analytical photogrammetry can be applied to estimate camera parameters from image data.

76. What are some of the social implications of robotics?

77. Provide a brief overview of the history of robotics.

78. What are the key attributes of the hierarchical paradigm in robotics?

79. Explain the concept of the closed-world assumption and the frame problem in robotics.

80. Discuss representative architectures used in robotics.

81. What are the attributes of the reactive paradigm in robotics?

82. Explain the concept of the Subsumption Architecture in robotics.

83. How do potential fields and perception contribute to robotic behavior?

84. What are common sensing techniques used for reactive robots?

85. Describe logical sensors and their role in robotic perception.

86. Explain the concept of behavioral sensor fusion and its significance in robotics.

87. What are proprioceptive sensors, and how are they used in robotics?

88. Discuss the role of proximity sensors in robotic navigation and obstacle avoidance.

89. How do topological planning and metric path planning differ in robotics?

90. What are some potential ethical considerations in the development and deployment of robotics?

91. Describe the technological advancements that have shaped the field of robotics over time.

92. How does the hierarchical paradigm organize decision-making in robotic systems?

93. Discuss examples of applications where the closed-world assumption is relevant in robotics.

94. Compare and contrast different representative architectures used in robotics.

95. What advantages does the reactive paradigm offer in robotics?

96. Explain the concept of behavior arbitration in the Subsumption Architecture.

97. How are potential fields utilized for navigation in robotics?

98. Describe how logical sensors can be implemented in robotic systems.

99. Discuss the benefits of integrating multiple sensory inputs through behavioral sensor fusion.

100. What types of information do proprioceptive sensors provide to robots?

101. Explain the role of proximity sensors in collision avoidance strategies for robots.

102. How does topological planning differ from metric path planning in robotic navigation?

103. What are some potential economic impacts of robotics on society?

104. Describe the cultural factors that influence the development and adoption of robotic technologies.

105. How does the hierarchical paradigm enable complex decision-making in robotic systems?

106. Discuss potential challenges associated with the closed-world assumption in robotics.

107. How do different representative architectures address the scalability of robotic systems?

108. Explain how reactive robots adapt to dynamic environments.

109. Discuss the advantages and limitations of potential fields in robotic navigation.

110. What role do logical sensors play in the perception-action loop of reactive robots?

111. How does behavioral sensor fusion enhance the robustness of robotic perception?

112. Describe examples of proprioceptive sensors commonly used in robotics.

113. Discuss the trade-offs between different types of proximity sensors in robotics.

114. Compare and contrast topological planning algorithms with metric path planning algorithms.

115. How might robotics impact employment and workforce dynamics in various industries?

116. Explain the role of government regulations in shaping the development and deployment of robotics.

117. How does the hierarchical paradigm facilitate modularity in robotic systems?

118. Discuss potential solutions to mitigate the frame problem in robotics.

119. How do different representative architectures handle real-time constraints in robotic systems?

120. Describe how reactive robots exhibit emergent behaviors.

121. Discuss the limitations of potential fields in handling complex environments.

122. What are some examples of logical sensors used in autonomous vehicles?

123. Explain the concept of sensor fusion and its role in enhancing robotic perception.

124. How do proprioceptive sensors contribute to the self-awareness of robotic systems?

125. Discuss the importance of path planning algorithms in autonomous navigation for robots.