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Mixture-of-Gaussians for Object Recognition in Grasping Tasks

Machine Learning

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Project Overview

- **Objective:** Develop a robust object recognition system for adaptive robotic grasping using Mixture-of-Gaussians (MoG) models.
- **Key Components:**
  1. MoG clustering for object classification
  2. Integration with grasping strategies
  3. Utilization of RGB-D images and 3D point clouds
  4. Expectation-Maximization (EM) algorithm for model training
- **Expected Outcome:** A system capable of recognizing diverse objects and determining appropriate grasping techniques.

Methodology

- **Data Collection:**
  1. Diverse object types (varying shapes, sizes, textures, materials)
  2. Visual features: RGB-D images, 3D point clouds
  3. Labeled data for model training
- **Learning Techniques:**
  1. Mixture-of-Gaussians (MoG) for clustering
  2. Expectation-Maximization (EM) for model optimization

Implementation

- **Feature Extraction:**
  1. Process sensor data to identify object characteristics
  2. Extract relevant features for clustering
- **Model Training:**
  1. Apply MoG and EM algorithms to cluster objects
  2. Develop a library of object categories and grasping strategies

Results & Future Works

- **Evaluation Metrics:**
  1. Classification accuracy
  2. Generalization to unseen objects
- **Future Work:**
  1. Expand object dataset for improved robustness
  2. Investigate real-time performance optimization

Thank You!