Course Name: Machine Learning

Weekly Report: 4

Group Name: XYZ

Submitted to faculty:

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WORK DONE THIS WEEK

1. Preprocessing Phase

- Preparation of dataset components took place concurrently during the project week while researchers followed the research methodology to create tracklets.

Dataset Selection:

- The analyst selected particular sequences from VisDrone dataset that consisted of authentic aerial surveillance video clips filmed by drones.
- The evaluation involved two objects taken from each sequence in the dataset.

Frame and Annotation Filtering:

- The selected objects obtained an entire pair of extracted frames and their respective annotations.
- All unintelligible and unfinished data points were discarded to obtain clean data for process.

Intentional Tracklet Fragmentation:

- The researchers applied artificial truncation to the long tracking series to generate short tracklet sequences with lengths between 15 and 60 consecutive frames for representing wild tracking scenarios.
- The framework organized video frames in consecutive groups to create tracklets that represent the combined effect of tracking interruptions accompanied by object blocking.

2. Feature Extraction

Motion Features:

- Computed average velocity across tracklets.
- The object size was captured through measurements conducted on the bounding box area.
- As a measure to analyze shape alterations the researcher calculated aspect ratio.

Appearance Features:

- The extraction of color histograms contained 512 values from each tracklet.
- Tracks used both SIFT descriptors and their associated 128 values as invariant descriptors to scale and rotation changes.

3. Tracklet Merging

Feature Matrix Construction:

- Combined motion and appearance features.
- Standardized extracted features for consistency.

KD-Tree Association:

- The Build_kdtree() function enabled KD-Trees to be built by performing data point splits that utilized separate axes.
- Nearest-neighbors identification occurred successfully with the help of these two functions which operated in an efficient manner.
- Merge_tracklets() functions as a system which unites fragmented tracklets by performing nearest neighbor matching algorithms.

Saving Results:

- The program stored the merged tracklet IDs using a single standardized file structure.

WORK TO BE DONE NEXT WEEK

1. **Performance Evaluation on Diverse Objects**: We will do testing on multiple object types like cars, bikes, buses and etc., inorder to assess failure cases.

2. **Cubic Spline Interpolation**: We will be implementing the interpolation techniques, from which we aim to achieve smoother trajectory recovery.

3. **Feature Optimization**: We will be enhancing the feature extraction part, inorder to balance both the accuracy and the computational efficiency.

4. **Dataset Expansion**: We will be exploring the additional datasets like VSAI, from which we can achieve better generalization.

5. **Adaptive Merging Strategies**: We will be investigating the graph-based approach and probabilistic approaches, which will pose as the alternatives to KD-Tree.