Title: Object Tracker

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Introduction:

To track a moving target using a robust visual tracking algorithm and shoot the laser mounted on the robot such that it points the moving target.

Description:

Some basic terms related to this project.

Visual tracking - The process of locating a moving object using a camera. An algorithm analyses the video frames and outputs the location of the moving target within the video frame. It is an important task within the field of computer vision.

Feature extraction - When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant (much data, but not much information) then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called feature extraction.

Stages in visual tracking:
1. **Object selection:** The object of interest is selected in the first frame.
2. **Feature extraction:** The selected object's features(may be color, edges etc) are extracted and the object is modeled using the extracted features.
3. **Tracking:** Now we process the subsequent frames and detect the object using the previous location and the object model. Tracking method used can be centroid method or best matching region in the neighborhood of the previous location of the object.

Fuzzy sets and logic - Fuzzy set theory is a means of specifying how well an object satisfies a vague description. For example consider the proposition "Nate is tall". If Nate is 5` 10``, then most people would hesitate to answer "true" or

"false", preferring to say "sort of". The issue is that the linguistic term "tall" does not refer to a sharp demarcation of objects into two different classes. But there are degrees of tallness. Fuzzy sets do not have sharp boundaries.

Fuzzy logic is a method for reasoning with logical expressions describing membership in fuzzy sets. Fuzzy control is a methodology for constructing control systems in which the mapping between real-valued input and output is represented by fuzzy rules.

A **radial basis function** (RBF) is a real-valued function whose value depends only on the distance from the origin, so that $\Phi(x) = \Phi(\|x\|)$; or alternatively on the distance from some other point c, called a center, so that $\Phi(x,c) = \Phi(\|x-c\|)$. Any function φ that satisfies the property $\Phi(x) = \Phi(\|x\|)$ is a radial function. The norm is usually Euclidean distance, although other distance functions are also possible.
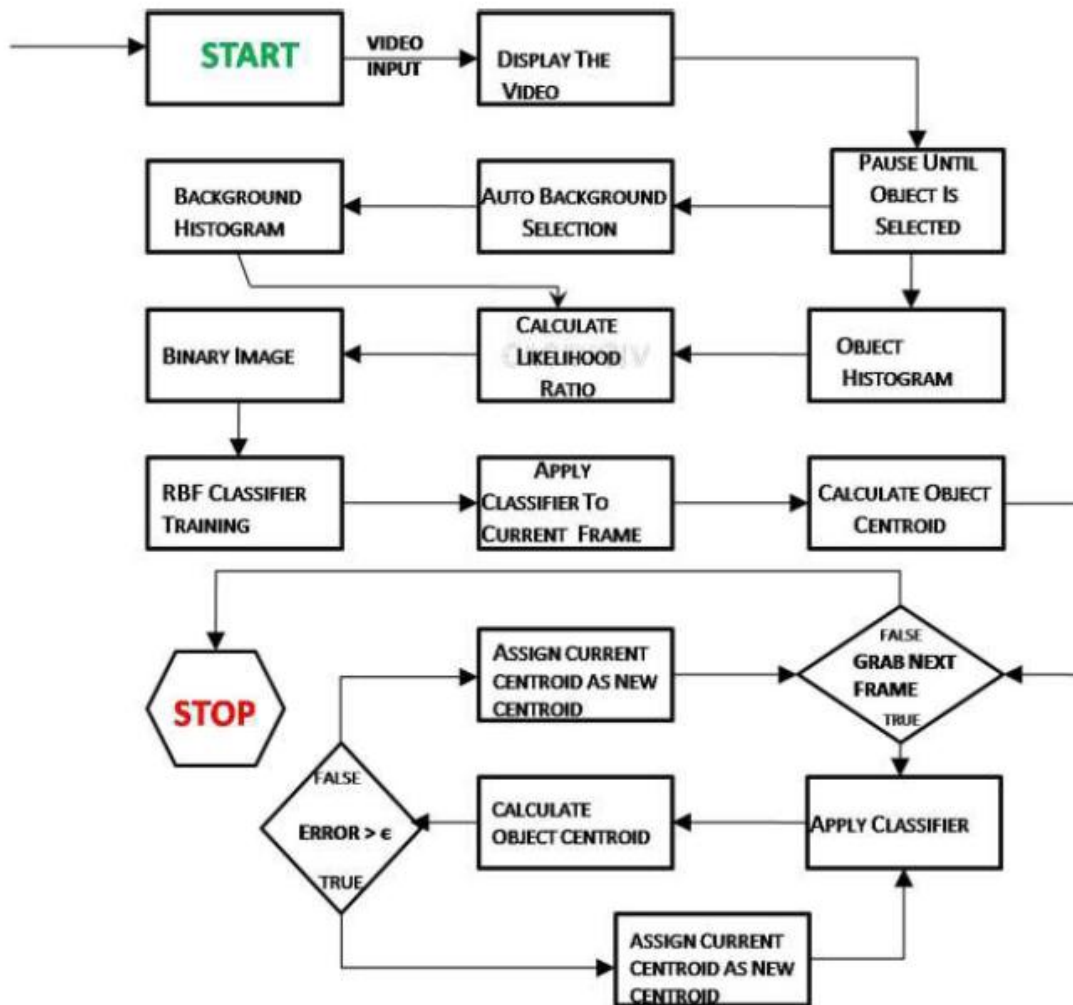
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