Project -1

Perception for Autonomous Robots-ENPM 673

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1. Definition first

AR Tag (Fiducial Marker) and why it is used??

A fiducial marker is basically a reference that we use as a center for our image processing we perform. Now it maybe something placed into our imaging subject or an mark which can be followed through.

A very simple example that we want to sight can be a an edges we use when we reverse the cars. The edges that we can follow to park car safely. So, it is basically an optical instrument that we may use to follow and use it as reference.

Corner Detection: and its significance:

Due to boundaries of an object this becomes a very important tool to find an features and detect and object in video sequence. Corners are the important tool to track an object afterwards and used it reference if it is moving. For an example, if we want to track a car it is better option to detect corners and then try to stick it as a reference. This is one of the primary step to define features and what to look for.

Due to its reachability it is used in image mosaicing, panorama stiching,3D modeling and object recognition. Corner detection overlaps with the topic of interest point detection.

Feature Generation:

Feature generation is used to reduce noise and extracting only an important information image to let out. This feature generation is also known as feature construction, engineering, Feature generation is also known as feature construction, feature extraction or feature engineering. There are different interpretations of the terms feature generation, construction, extraction and engineering.

Generally in machine learning and image processing extraction starts from the set of information we have and we do this process to reach final state.

The main process we do here is reduce the dimension and initial data is bifurcated in more manageable groups and which are accurately depicting larger data set.

Generally in statistics we try not to go to all people in nation to find whom they are voting. Rather we find a subset of people on which all the process is done which reflects overall trend.

After perfect implementation generally we have more information and useful depiction which allows us to proceed further.

Feature Matching:

Feature matching is used to find corresponding features from 2 similar database based on differences. One database is data we want to process and the other one is we want to compare or called target data. These databases are really different from each other and are not perfectly aligned. But after process of data we try to align with target data.

Edge Detection:

Edge detection is a fundamental tool for machine vision and image processing. But why it is important??

For an example we want to know where your object has curvature and any discontinuity. Generally we invert the color or look for change in brightness.

Anamolly in brightness gives information about change in color or about brightness. This tool is thoroughly used an generally a very first step in image processing. Various methods of feature extraction is available for example a canny edge detector and bunch of other algorithms.This mathematical tool is very first step and rather gives intuitive sense of an change.

For example if we transit from black to white pixel edge detector indicated the user that intensity has been changed.

Edge detection includes a variety of mathematical methods that aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. The same problem of finding discontinuities in one-dimensional signals is known as step detection and the problem of finding signal discontinuities over time is known as change detection. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction.

Homography Estimation:

Generally any 2 images of the same plane are related by holography and it is assumed that we use pinhole cameras. This method has a real world practical implementation like image rectification and computation of camera itself. We can know the rotation and translational between 2 images. So we try to compute holography matrix and this information is used for many uses like correct correlation and appearance between original camera motion.

Process

We first of all imported the library like NumPy and OpenCV in our python environment. This was the very first step in the process.

2. Then we tried to open video frame wise.

3. We converted an image in greyscale.

4.Then we smoothed image using gaussian filters. This helped me removing false detection.

5.Then we applied a special command cv2.thresold.

6. This is the time to detect edges in images and that is why we found various contours with special function.

7.Tehn we chose ROI(Region of interest) using hearty return parameter.

8.Then we computed extreme points and used transformation matrix.

9. Then we used we used warp perspective function to transform ROI.

10.Used orientation block and encoding scheme custom tag created.

This was process we have followed to detect edges which was very first task of the project. We created a custom tag.