Weekly Status Report 2009.04.22

Group 1 Smooth Walker

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1. Overall

In the last two weeks, we were doing some researching and experiments in how to make the dog go straightly. The approach is the one that teacher told us in the last meeting – use the AIBO's built-in image extracting ability to track a predefined-color object and compensate for the mechanism inaccuracy while the dog is walking. The approach seems to work theoretically but we encountered some problems when to deploy it. Otherwise, we tried the Matlab code from group two to analysis picture took by AIBO offline. It basically works but there is also issues(detailed later).

2. Details

(1) Compensate walking direction

Done:

We looked into the BallHeadTracking sample in OpenR SDK and generally understand what it does and how it do it. Then we extract the image taken and image analysis function from the sample and incorporate them into our own SmoothWalker project. We tested how well the object (color) extraction ability the dog can achieve. Under the normal lighting condition in the project room, the dog only can extract the red ball when the ball is put less than around 0.5-meter-far. We are surprised about the experiment result and try to reduce the image analysis threshold (count of pixels found) from 10 to 1. The dog then can extract the red ball when the ball is put less than about 1.5 meter far. Here is the problem, the valid extraction distance is possibly 1.5 meters and too short for the dog to go to the wrong direction. As the object is
supposed to be put in a fixed place, then the object extraction feature is useless for compensation.

Next step:
We plan to farther the distance that the dog can “see” a ball. After that, if successfully, we will analysis the extraction point and try to dynamically adjust gait to compensate for mechanism inaccuracy. (But how?)

(2) Matlab image analysis

Done:
We try to run the code from group 2 to analysis picture from AIBO in Matlab. The code is for BMP format. And our picture format from AIBO is JPG. After adding some image reading API, the code basically works. But the problem we found is that the noise point in the analysis result. The code is to extract black round from the image and it usually extract more than one point.

Next step:
- How to reduce noise in picture?
- To improve the timing about when to take the picture while the dog is walking. Because now the dog periodically take image each 2 seconds, if we can take picture while each step is done, it could be better for accuracy and usefulness of image analysis result.
(3) Others

If we still have time next week, we will try to optimize the existing gait to see if it can walk better. This is, I think, the most efficient way to optimize the result before we implement those “analysis approaches”. But this is also hard. We tried to do this several weeks before and finally get a ruined gait after a whole afternoon’s work.