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Tracking of Multiple Arbitrarily Moving Objects Using Active Contour Model

Kanada Takashi

School of Information Science,
Japan Advanced Institute of Science and Technology

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The operating of an image sequence costs a great deal (process time, memory) because it has enormously an information quantity. It is necessary to reduce the enormous information quantity of an image sequence to make a cost decrease. The reducing of the enormous information quantity of the image sequence can compress an image, and can take only to a necessary data out of the image sequence. The recognition understanding of the image sequence is necessary to be taken only to a necessary data out of the image sequence. The extraction tracking of a target object is indispensable to the recognition understanding of the image sequence.

Many methods for tracking of a moving object have been proposed. Three of the technique based on the characteristics point, based on the territory division, and based on the contour extraction of target can divide it.

The method for tracking based on the characteristics point is set up on target can realized comparatively easily when the movement of the target is restricted (the target moves only to the straight line, e.g.).

The method for tracking based on the territory division tracks by using the territory where be divided for the feature (color, optical flow, e.g.) in the image. This object tracking becomes possible by corresponding that territories are matched by the feature between the different frame images even when some targets move multiple arbitrarily. Although there are many cases that it becomes necessarily other processes to make both correspond because a divided territory doesn't always align with the target.

The method for tracking based on the contour is extracted in the image becomes a problem whether the contour of the target which became stable how is extracted.

These are some problems with the method for tracking proposed like this so far, it can't track some targets move multiple arbitrarily, in case the target changes sharp, especially

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in case the number of target will change (one object split to some objects, and some targets overlap each other).

It was proposed to solve those problems that the method for tracking makes use of Active Contour Model (Snakes) which the contour can be connected even when the contour of target in the image is partly missing, and the contour which be extracted in the image became stable. The method for tracking makes use of Snakes has both property of the method for tracking based on the contour is extracted in the image and property of the method based on the territory division for reason of closed a curved line (region) which can be extracted by Snakes. Consequently it can track in case the target moves multiple arbitrarily (in case a target moves a little between the different frame images), in case target changes sharp in the middle of the tracking. Although the method for tracking makes use of Snakes is too difficult to track in case the some targets move multiple arbitrarily, especially in case the number of target will change.

The conditions that such a track becomes difficult happen frequently at the general scene.

In this paper, a new method for tracking of some target objects is proposed to cope with those problems (in case some target objects move multiple arbitrarily, in case the number of target will change).

A new method for tracking of moving objects which has three characteristics and to propose explains how to track it in the following.

- Two Snakes are used together to extract a contour.

  It must be able to extract the concave contour to track even when the target changes shape. Snakes that the concave contour can be extracted is used to extract a contour. The concave contour of target can be extracted by using Snakes takes process time too much. For that purpose process time is sped up by using two Snakes that one can extract swiftly convex contour and the other has kept the contour splitting. First step, Snakes which can extract swiftly convex contour is applied. Second step, the contour extracted in the convexity is given with the initial contour for Snakes which has kept the contour splitting that a contour splits into some close lines. As a result, the contour can extract even when the concave target and the some targets.

- A new method for tracking can tracked by using Snakes even when some targets overlap each other.

  Snakes can't be extracted the contour to get into the inside of other targets when some targets overlap each other. Therefore a object tracking made use of Snakes can't track the target when some targets overlap each other in the middle of the tracking. So a new function introduce the contour merging that some contours merge into a closed line so that an contour may prevent it from getting into the inside of other target in case some targets overlap each other. As a result, the object tracking made use

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of Snakes becomes possible when case some targets overlap each other. Moreover a new method for tracking which is introduced contour splitting merging becomes possible even when the number of target will change in the middle of the tracking.

- The trajectory can decide even when some targets overlap each other.

    The extraction of the contour of target learned to cope by the introduction of the contour merging when some targets overlap each other. Although the target can't match between the different frame images. Therefore those trajectories can't decide when some targets overlap each other. To decide trajectory, the contour of target can be matched between the different frame images based on both the contour which it can get by the object tracking made use of Snakes and A color frequency which is the feature of the target region which be extracted by using Snakes. As a result, those proper trajectories can decide even when some targets cross in the middle of the tracking.

Although there are some conditions that object tracking can't the target, and trajectory can't decide when proposed a new method for tracking applied. They are those conditions, in case the feature of target changes, in case it happens many times that some targets overlap each other, and so on.