Apps Specs
3- Action Sequence and Motion Recognition

Description

Main Idea

Many sports enthusiasts, from novice photographers to professional publications, rely on manual image segmentation with tools like Photoshop to combine multiple images of a bike trick or basketball dunk into a single image by cutting out the foreground of each image and overlaying it onto the background of one image.

Assume a fixed camera that shoots a short video of some motion. A first step is determining a number of key frames (burst shots) that mainly construct the motion sequence. The goal of this project is to develop an algorithm that can automatically combine multiple images generated from burst shots of an action into a single image that clearly shows the full action, as shown in Figure 1. It also recognizes the moving object motion (walk, wave, bend, etc.).

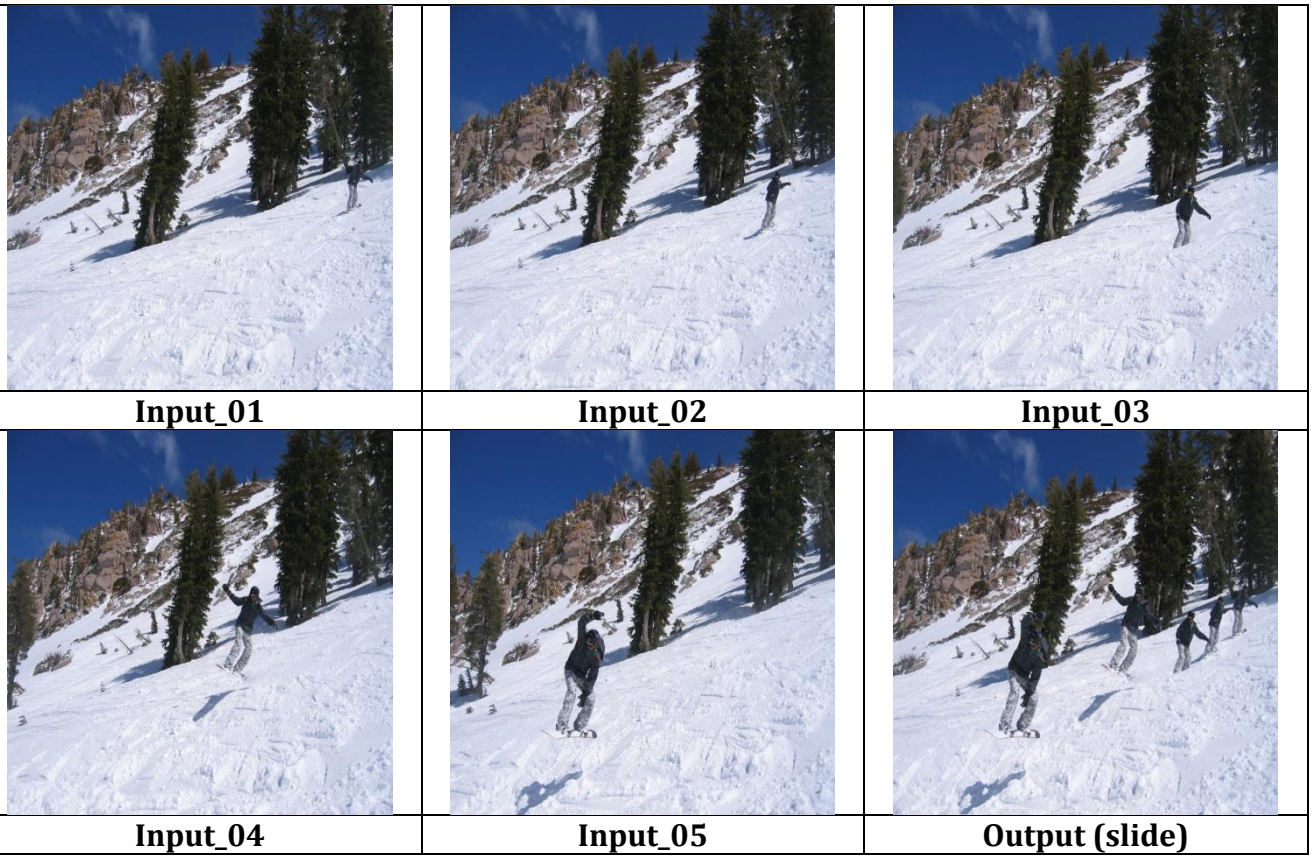

Figure 1: Sequence of input images and the final output image

	
a. Full body motion (catch)	b. Body part motion (wave)

Figure 2: two types of a moving object

Minimum Requirements

Construct an action sequence image and identify the motion from a set of burst shots with

1- Fixed camera position and uniform illumination.
2- Only one moving object with
    a. Full body motion,
    b. Body part motion, as shown in Figure 2.
3- Scenes with dynamic backgrounds (e.g. trees/water).

Possible Add-ons (Bonuses)

Construct an action sequence image and identify the motion from a set of burst shots with

1- Moving camera.
2- Multiple moving objects.
3- Non-uniform illumination.

Suggested Search Tracks and Keywords

You may use some/all of the following keywords as a guide (not restricted to them):

1- Motion segmentation
2- Morphological operations
3- Region properties
4- Tracking
5- Matching and classification

Test Images for Minimum Requirements

Case1: single object, 2D whole body motion, static background, fixed camera, uniform illumination.

Case2: single object, 2D body part motion, static background, fixed camera, uniform illumination.

Case3: single object, 2D whole body motion, dynamic background, fixed camera, uniform illumination.

Case4: single object, 2D body part motion, dynamic background, fixed camera, uniform illumination.

Test Images for Bonuses

Case4: (case1 and case 2) but with moving camera.

Case5: several moving objects.

Case6: non-uniformly illuminated versions of cases 1-5.

References

1- Textbook Ch. 9: Morphological Image Processing
2- Textbook Ch.10: Image Segmentation
3- Textbook Ch.11: Representation and Description