

# Analyzing Taekwondo Poomsae Video Based on Background Modeling Approach

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## Abstract

One of the most popular martial art programs in world-wide is Taekwondo. It is an official Olympic game. Over 177 countries, more than five million people world-wide practice Taekwondo as their martial art style. Specifically, the Poomsae is a series of basic movements in Taekwondo for offensive and defensive techniques. Despite the high popularity and long history of Taekwondo, there has been less effort to systemize Taekwondo Poomsae competition, which may cause judging issues and be a hurdle of its proceeding to a new game in Olympics. In this poster we will mention how to use background modeling approach in Taekwondo Poomsae videos that can help in eliminating the noises around the player which could be caused by audience. At the end, it will be very helpful in analyzing Taekwondo Poomsae captured videos.

## Background Subtraction

### Step 1:

Uses a reference background image for comparison purposes.



Figure 2. Example of background scene

### Step 2:

Current image (containing a Taekwondo player) is compared to reference image pixel by pixel.



Figure 3. One Shot from Taekwondo Poomsae videos

### Step 3:

Places where there are differences are detected and classified as a Taekwondo player.

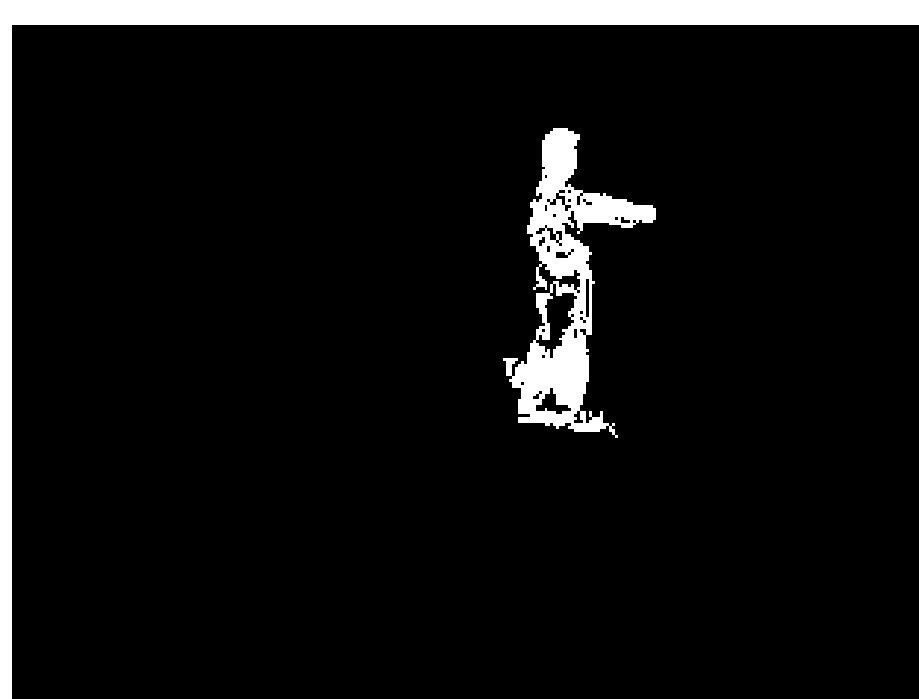


Figure 4. After Background Filtering

### 2. Median Filter

Assuming that the background is more likely to appear in a scene, we can use the median of all frames as the background model

### 3. Convert to Binary

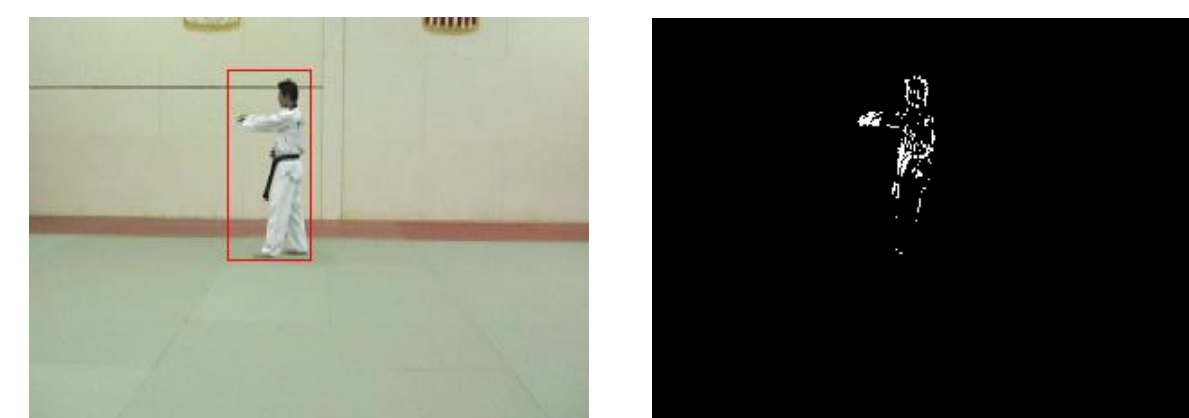
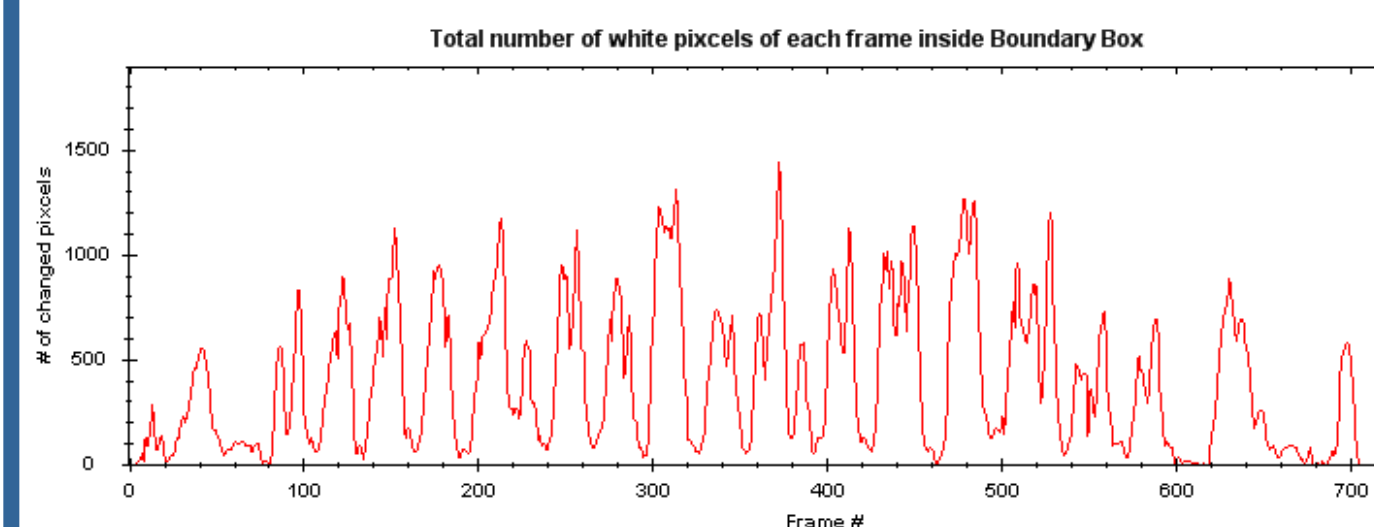
After getting the difference between each frame and the background, convert the different pixels to white.

### 4. Eliminate small objects

In order to reduce noises around the player, any small object which is smaller than the player will be removed

## Results

The Following graph is based on the total number of white pixels of each frame. The white pixels represent the actual movement of the player



Each movement can be classified based on Y-axis. When the Y-axis value close to 0, it means that there is a pause between one movement and the next one.

## Poomsae line and Movements

The following figure shows the Poomsae line and movements of Taegeuk 1 Jang that is the most basic Poomsae in Taekwondo consisting of walking and basic movements such as block, punching, and kick.

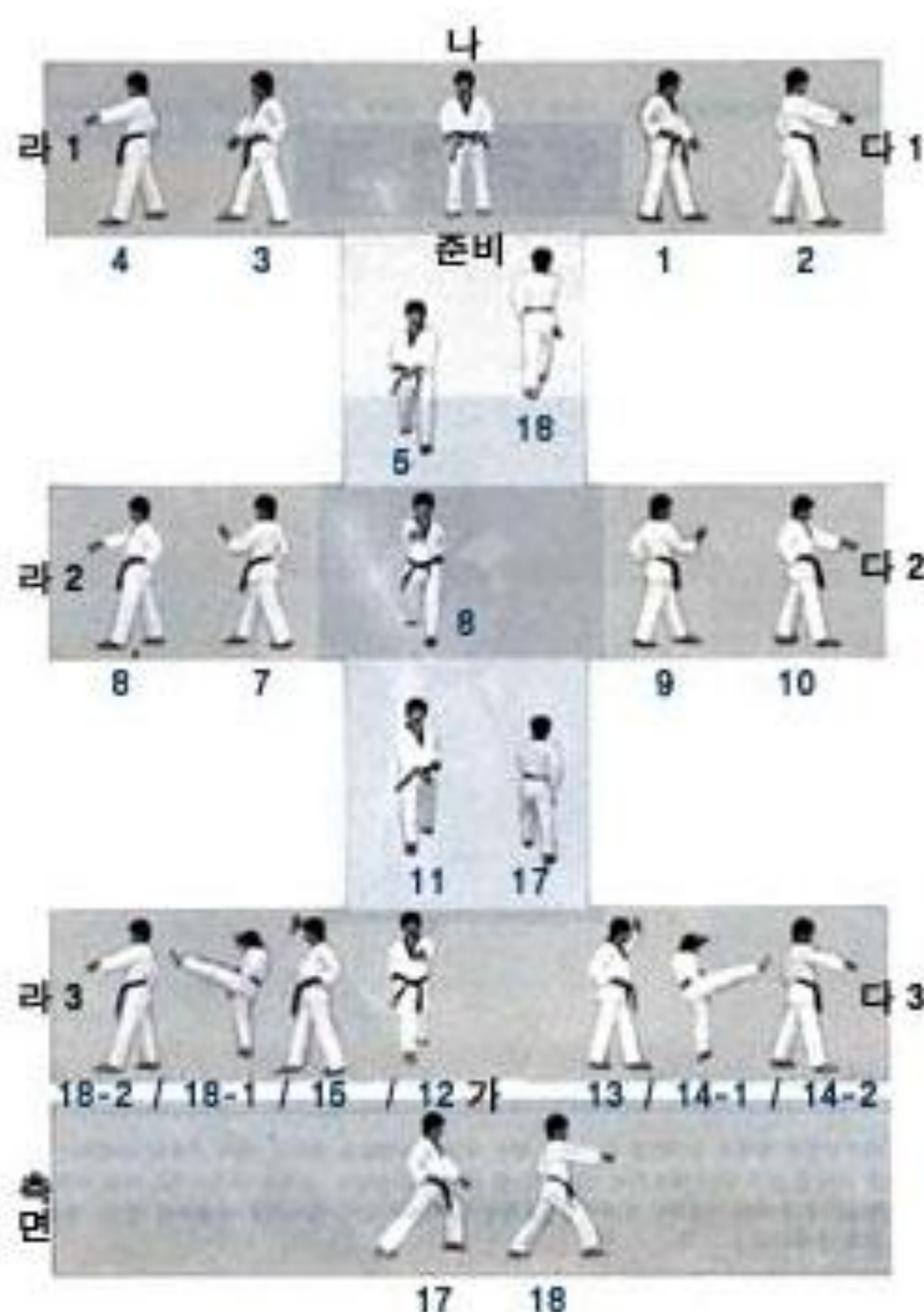


Figure 1. Taegeuk 1 Jang Poomsae line and movements

## Background Modeling Algorithm

### 1. Convert to Grayscale

To reduce the size of the image, and reduce the time to get the result.

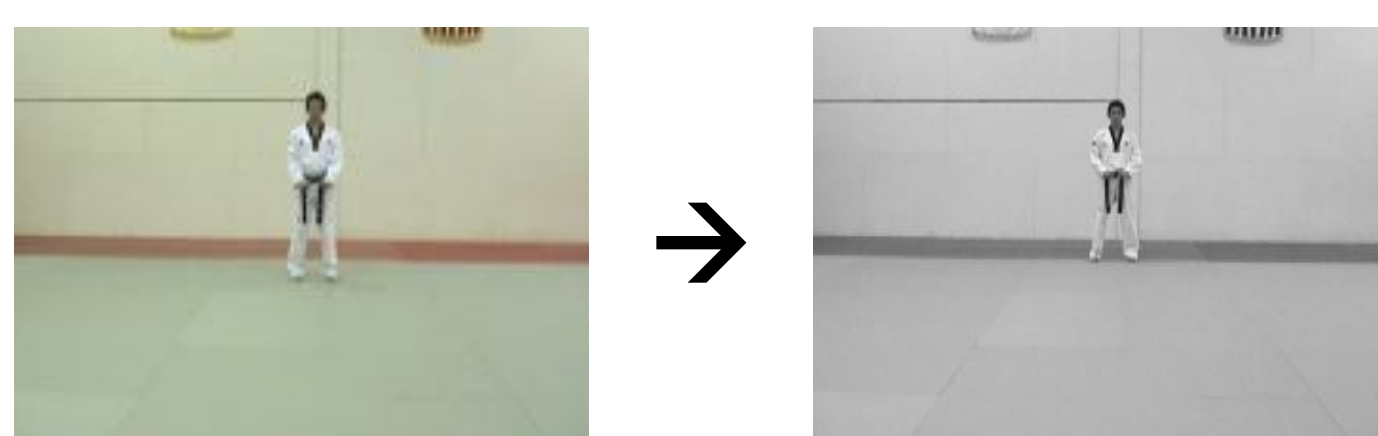


Figure 5. Example of converting to Grayscale

## CONCLUSION

This research explains how to use background modeling approach in Taekwondo Poomsae videos to get a clear shape of Taekwondo player that can help in future to analyze Taekwondo videos also make it easy to classify each movement of the player and test the correct order of movements. In addition, using this approach going to eliminate the noises around the player which could be caused by audience.