



HPI SemWeb | OCR

# A Skeleton Based Binarization Approach for Video Text Recognition

Haojin Yang, Bernhard Quehl, and Harald Sack

## Problem

Typically, **video text** is embedded in rather **heterogeneous background** with low contrast ratio, which makes it **difficult** to be recognized by means of **standard OCR software**. Therefore, text pixels have to be separated from background beforehand by applying appropriate **binarization** techniques.

Original Image

Florian Kurz

Grayscale Image

Florian Kurz

Text Gradient Analysis

Florian Kurz Florian Kurz

Seed Selection Process

Florian Kurz Florian Kurz

Seed selection procedure works as follows:

if light text on dark background then  $S_p > T_{mean} + \sigma \wedge S_p \leq T_h$

if dark text on light background then  $S_p < T_{mean} - \sigma \wedge S_p \geq T_l$

Let  $T_h$ ,  $T_l$ , and  $T_{mean}$  denote the highest, lowest, and mean grayscale value of all skeleton pixels, whereas  $S_p$  denotes the grayscale value of seed pixels.  $\sigma$  is a variance factor.

Seed-region Growing

Florian Kurz Seed image



Seed regions are recursively extended in north, south, east, and west directions until text boundaries are reached.

Binarization Result

Florian Kurz

## Solution

In this paper, we propose a new method for **video text binarization**. Unlike traditional approaches, we utilize **image skeleton** and edge maps to detect the text pixels.

- We first analyze the distribution of image skeleton maps in order to estimate the **text gradient direction** which is necessary to determine whether there is light text on dark background or vice-versa.
- Subsequently, we calculate the **average grayscale value of skeleton pixels**, which are extracted in the correct text gradient direction.
- Making use of this value the **seed selection** process can be applied followed by a **seed region growing** algorithm by which seed regions are recursively extended in four directions until text boundaries are reached.

## Result



## Contact

Haojin Yang, Bernhard Quehl, Harald Sack

Hasso-Plattner-Institute (HPI)  
for IT-Systems Engineering  
Prof.-Dr.-Helmert Str. 2-4, 14467 Potsdam, Germany

email: {haojin.yang, bernhard.quehl, harald.sack}  
@hpi.uni-potsdam.de

phone: +49 (0)331-5509-548  
fax: +49 (0)331-5509-325

<http://www.yovisto.com/labs/VideoOCR/>

mediaglobe  
the digital archive

HPI Hasso  
Plattner  
Institut  
IT Systems Engineering | Universität Potsdam