Computer Vision Systems Programming: Übungs Präsentation

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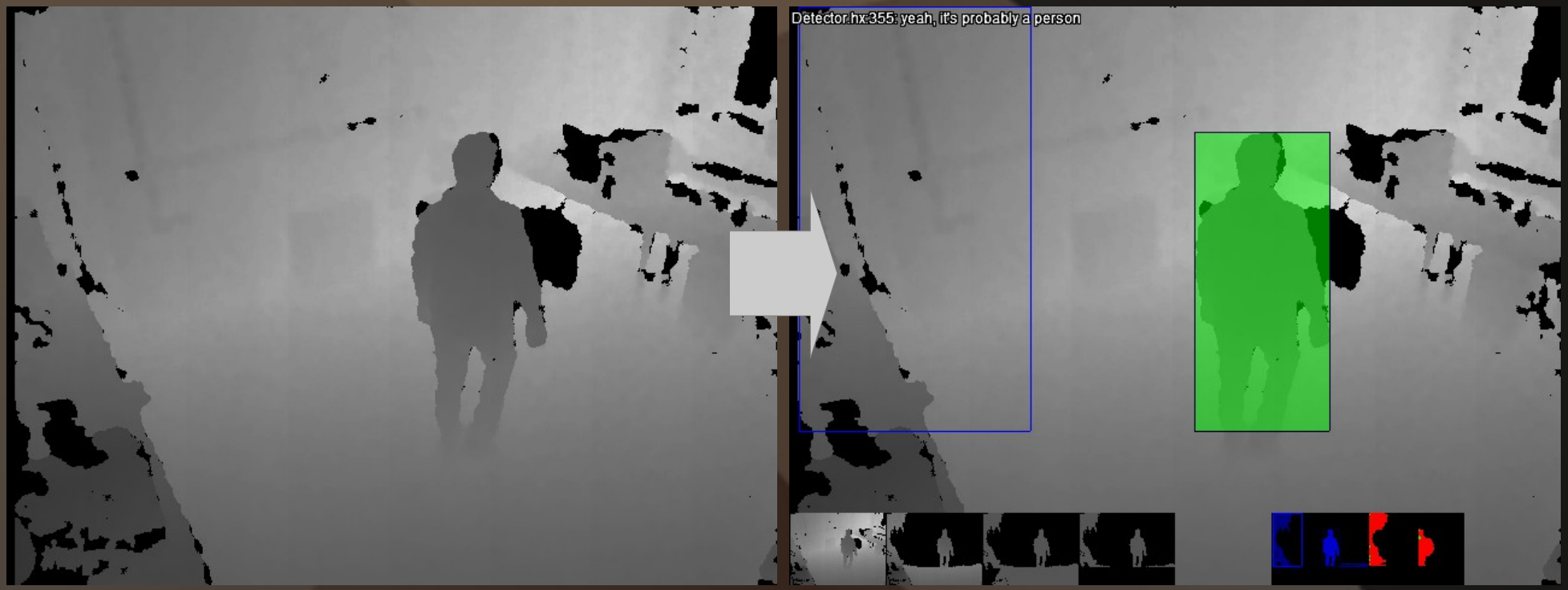
Theme

- Person recognition based on depth data.



Development Environment

- Haxe NME
  - Haxe is an open-source high-level multiplatform programming language and compiler that can produce applications and source code for many different platforms from a single code-base. [wiki]
  - NME is a framework for building games and applications for mobile, desktop and web platforms. [nme.io]

Method

- Downsampling;
- Slicing;
- Removing the floor;
- Object separation;
- Finding the person;

Downsampling

- The original image contains a lot of redundant data;

  \+ will improve performance and reduce complexity, unimportant data will be discarded;

  – valuable data can get lost;

- Used method:

  Scaling to 12.5% without interpolation.

Downsampling (Image)

Slicing

- Simply getting a slice of data from a certain range, e.g. getting only the foreground;

  \+ improves precision, allows to use different parameters for different ranges;

- Used method:

  Simple thresholding, with two values.

Slicing (Image)

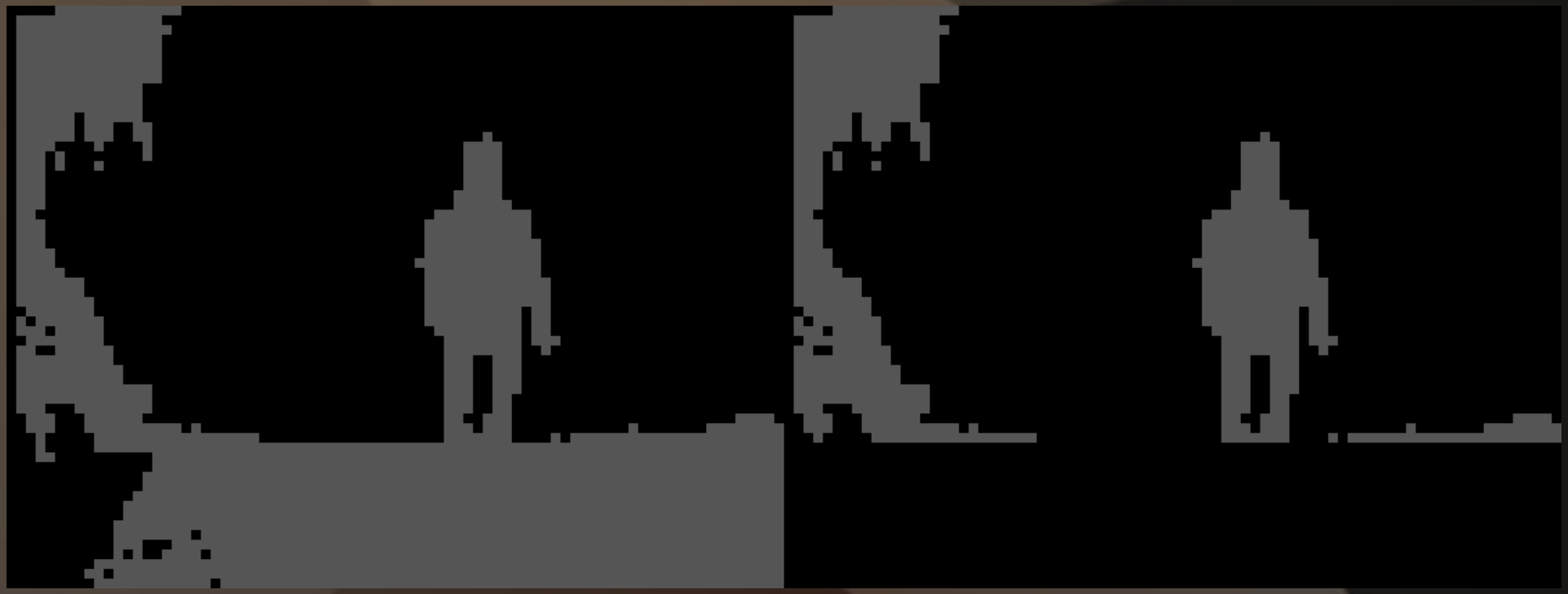
Object separation

- Partially done by slicing;
- Remove the ground;
- Group the pixels and find group bounding boxes;

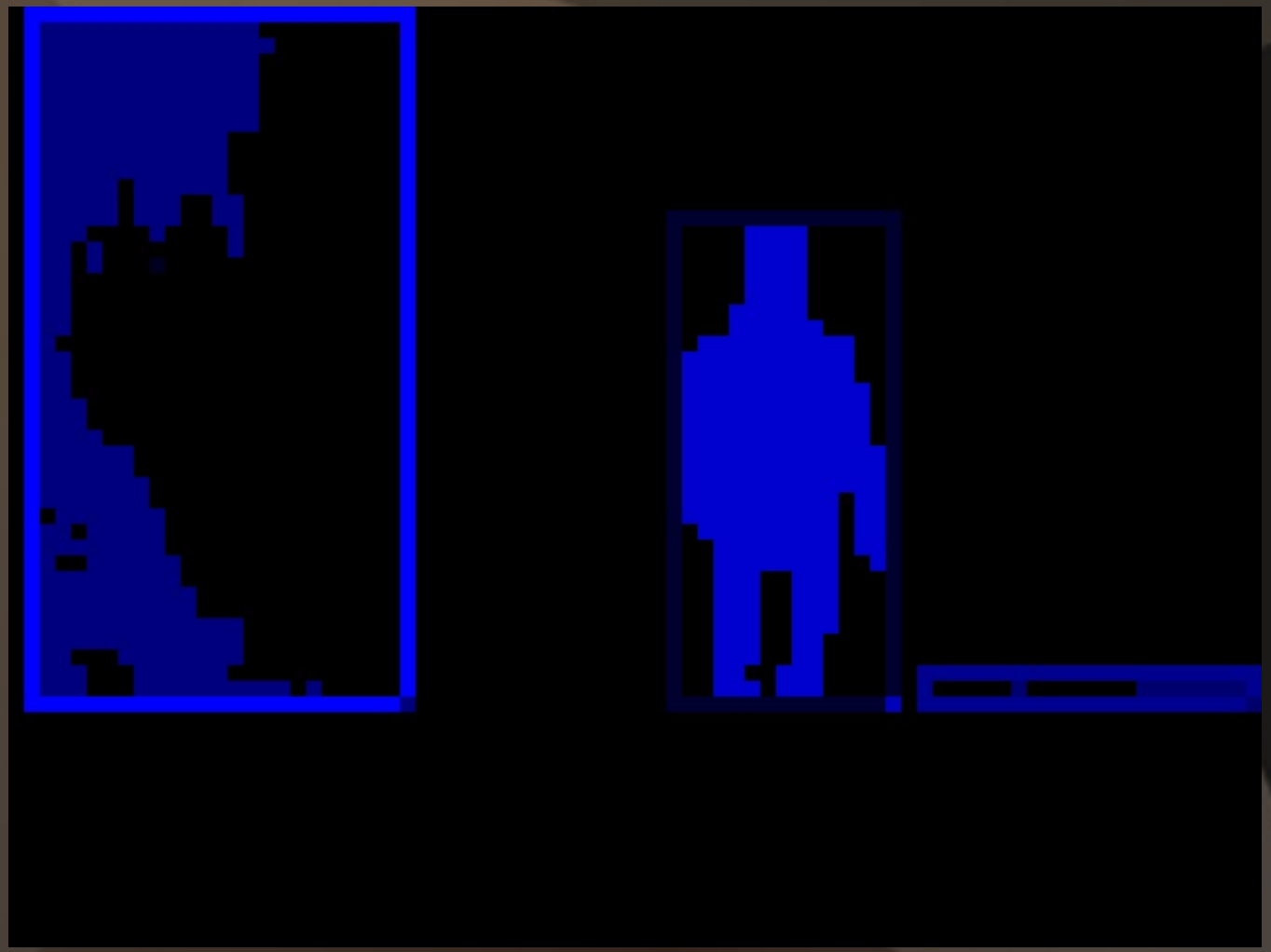
- Used method:

  Posterization + scan line checking;

Object separation (Image)



Object separation (Image)(2)



Finding the person

- Idea:

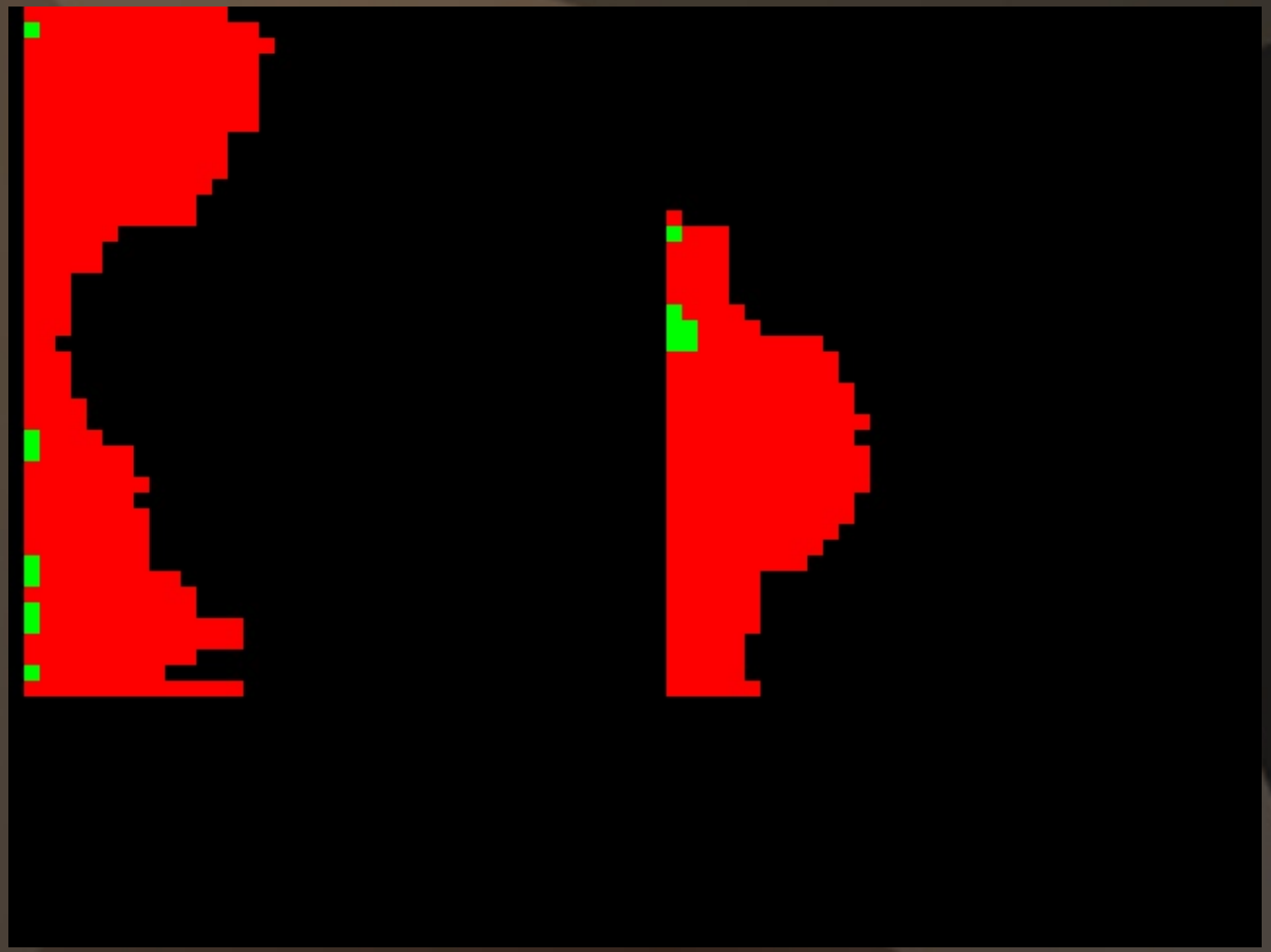
  For every found group let's treat the data inside the bounding box as a one dimensional function f(y) = x, where y is the index of the scanline and x is the number or non-zero pixels in the scanline.

  Let's apply an edge filter to this function [-0.5, 0, 0.5].

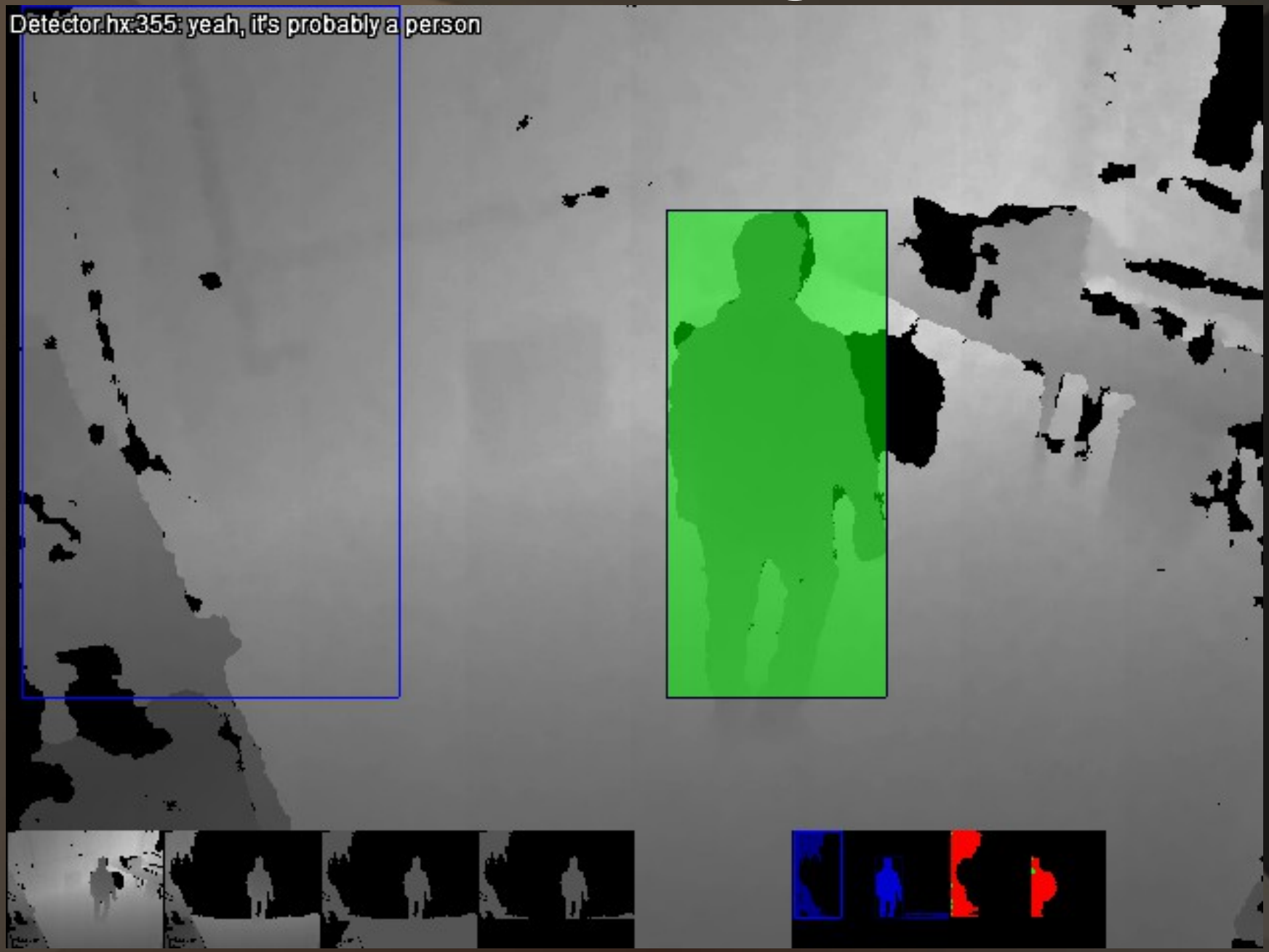
  This will give us the places with sharp changes in width. In a human body such a change will often identify the neck/shoulder area (shoulders are twice as wide as the head).

  Having that in mind we can assume that everything above this point is the head and we can check the width to height ratio for that part of the group. I accept 2:3 – 1:1 as a valid ratio.

Finding the person (Image)



Result (Image)

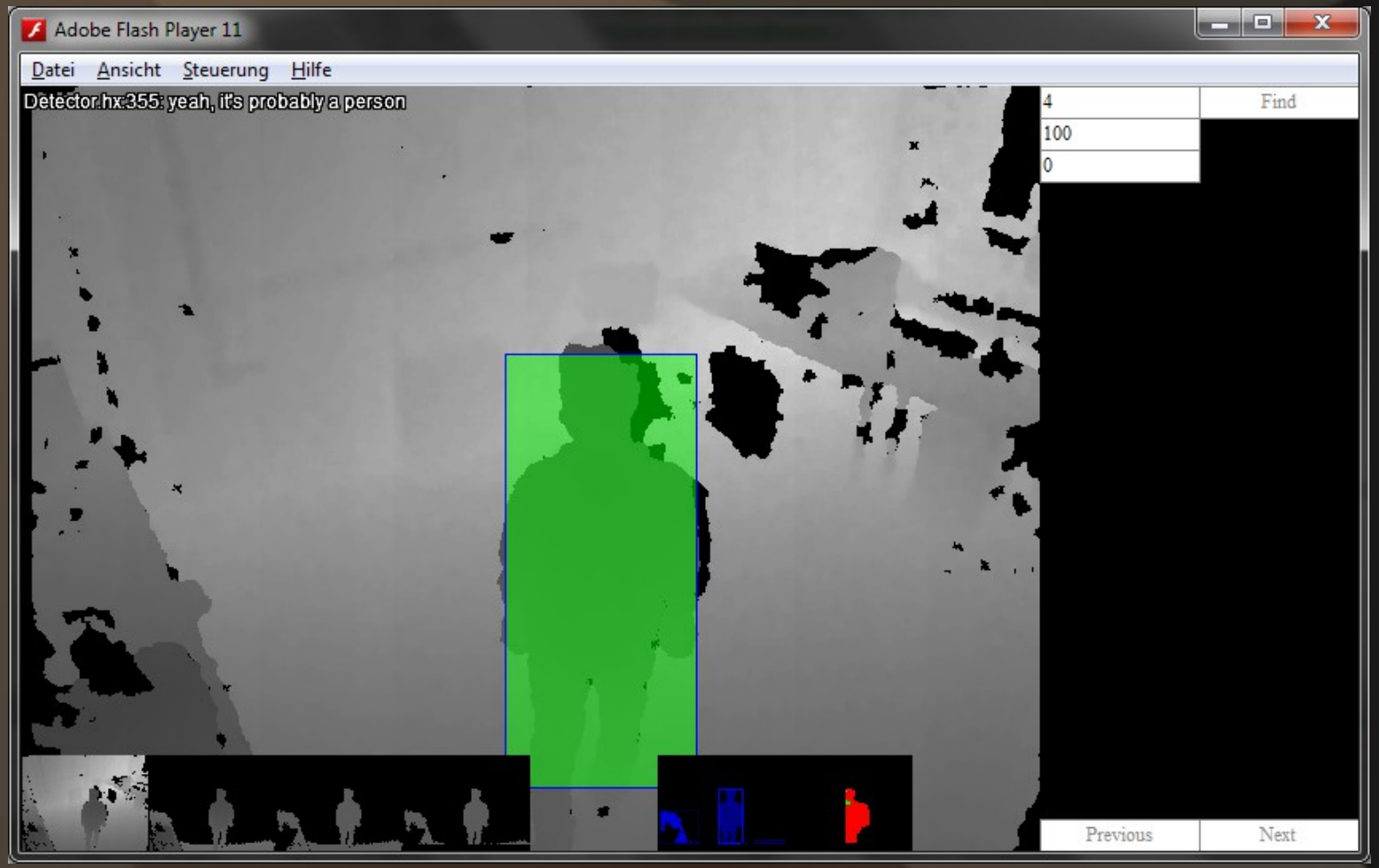


Problems and Limitations

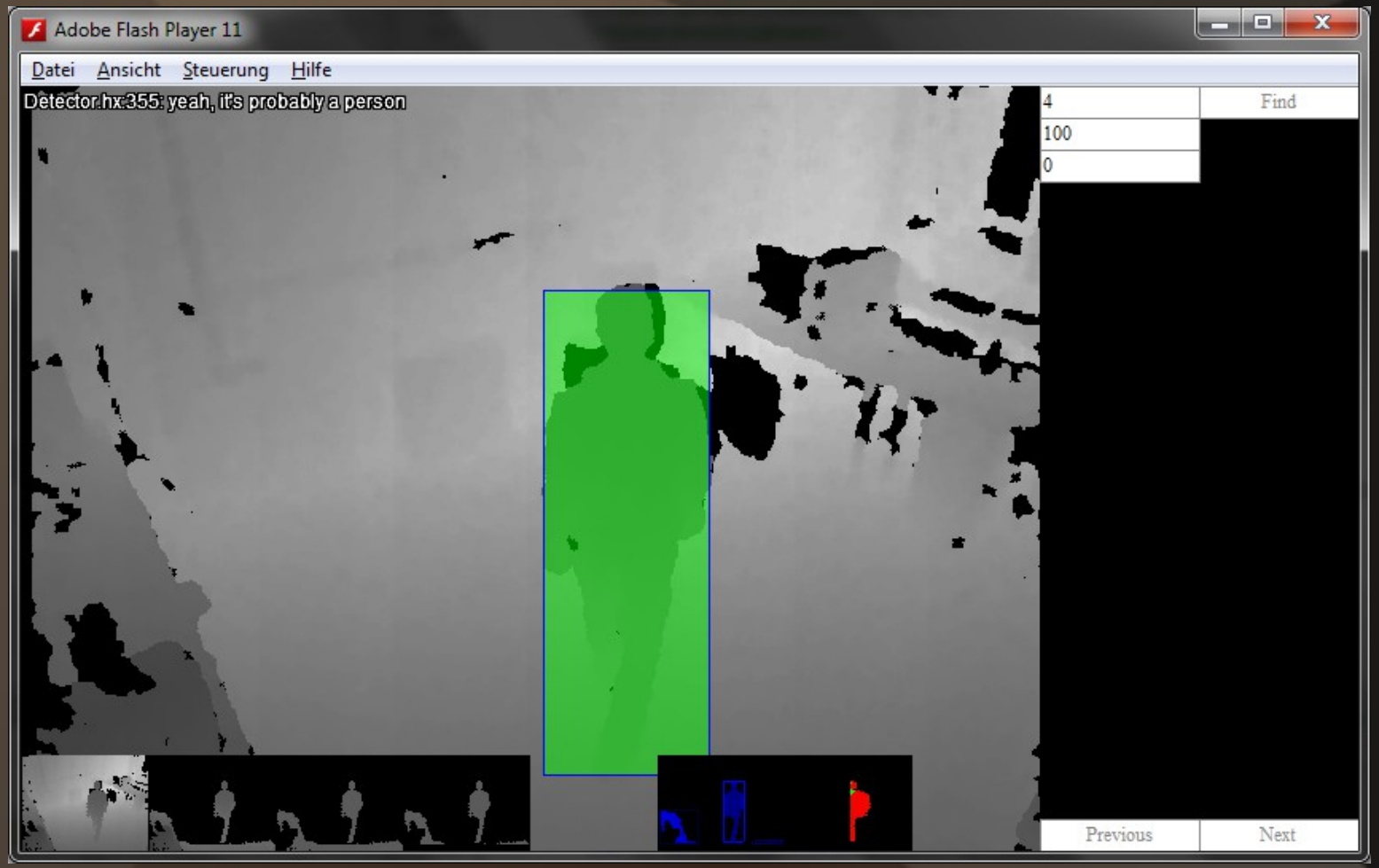
- Different distances require different sets of parameters.

- Doesn't handle far away objects very well;
- Will fail if the head is covered;
- Might have problems recognizing people form the side view;
- Won't recognize a person if he/she is too close to some other object.
- Person must be standing straight;

Images


Adobe Flash Player 11
Datei Ansicht Steuerung Hilfe
Detector.hx:355: yeah, it's probably a person
4
Find
100
0
Previous
Next

Images (2)


Adobe Flash Player 11
Datei Ansicht Steuerung Hilfe
Detector.hx:355: yeah, it's probably a person
4
Find
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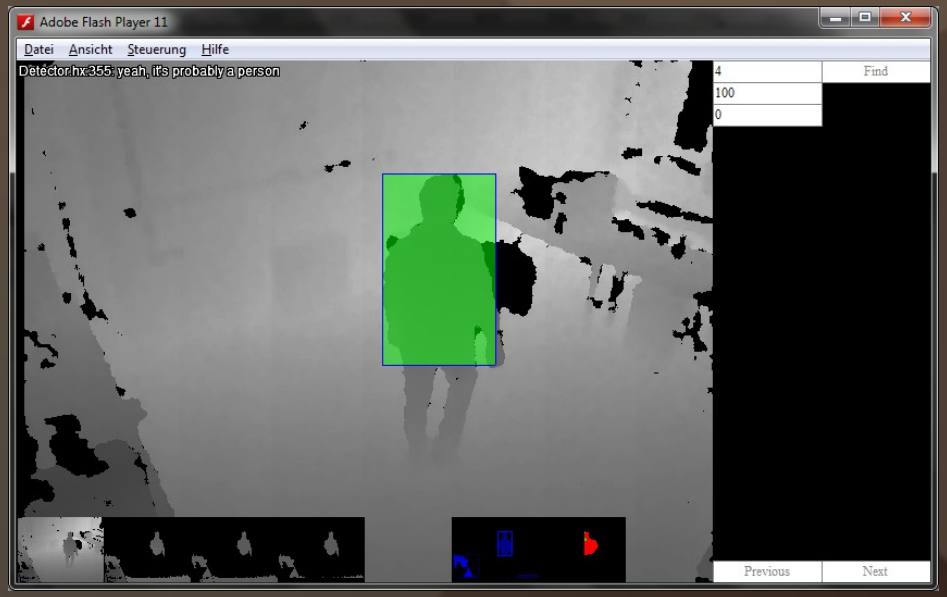
Previous
Next

Images (3)


Adobe Flash Player 11
Datei Ansicht Steuerung Hilfe
Detector.hx:355: yeah, it's probably a person
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Find
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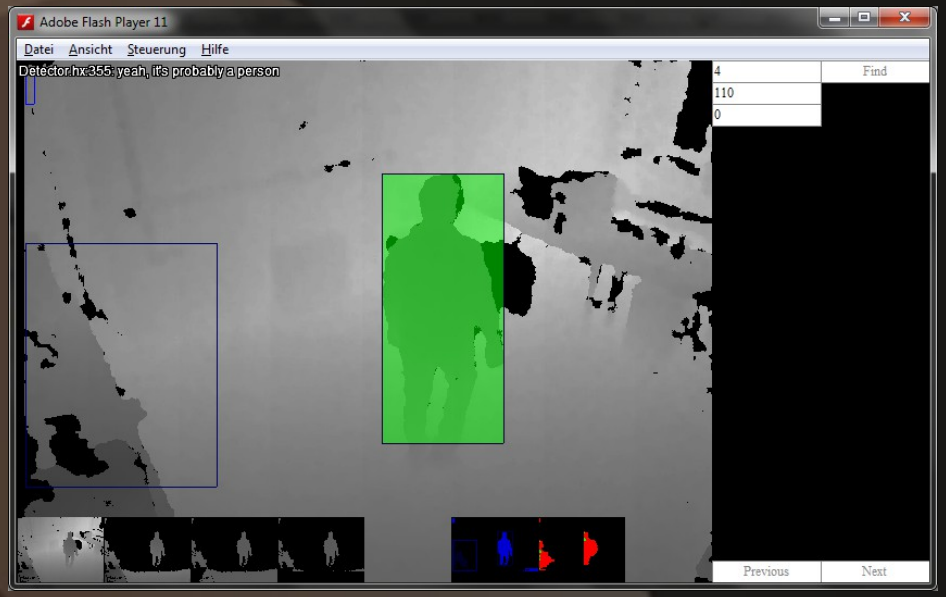
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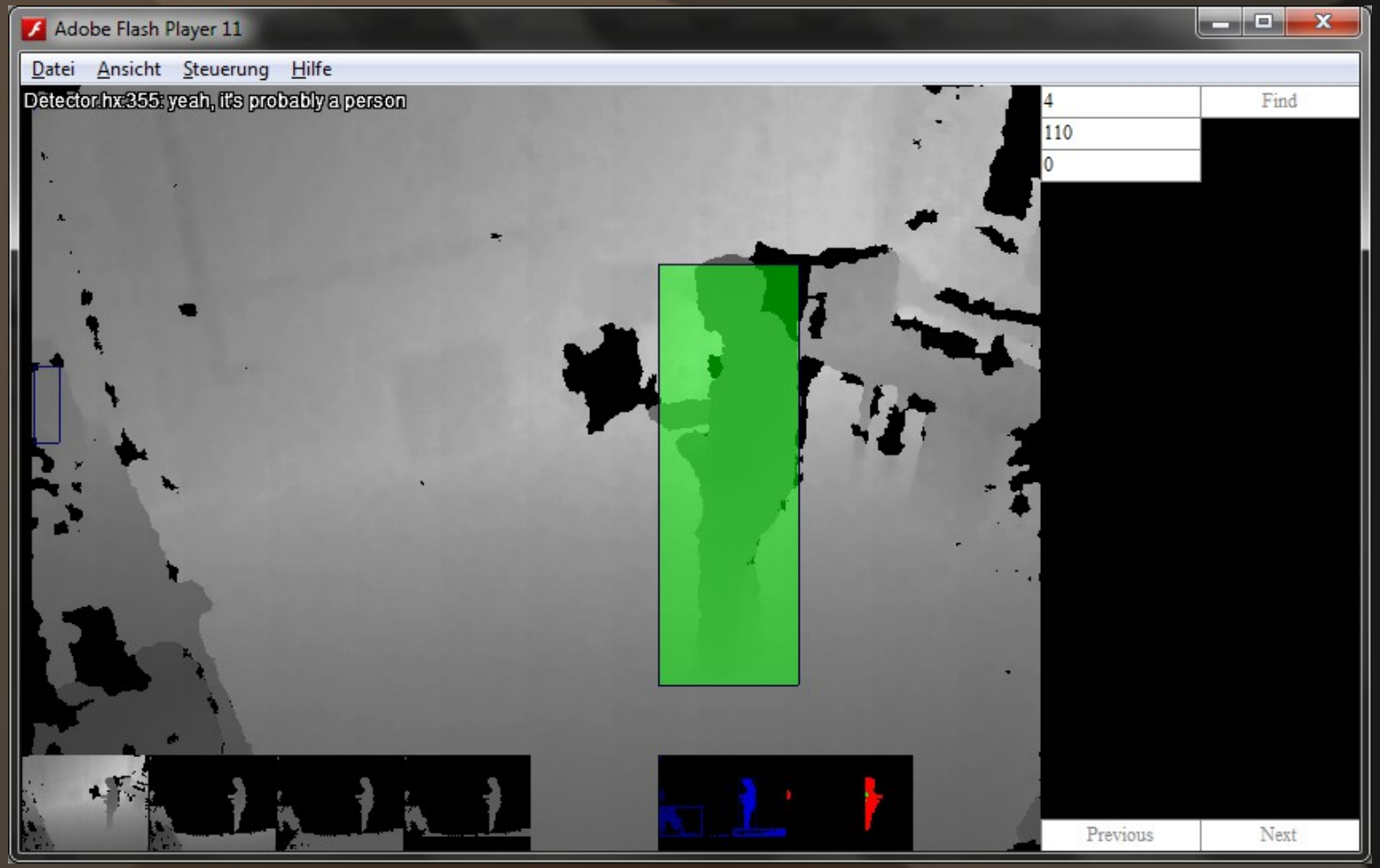
Images (4)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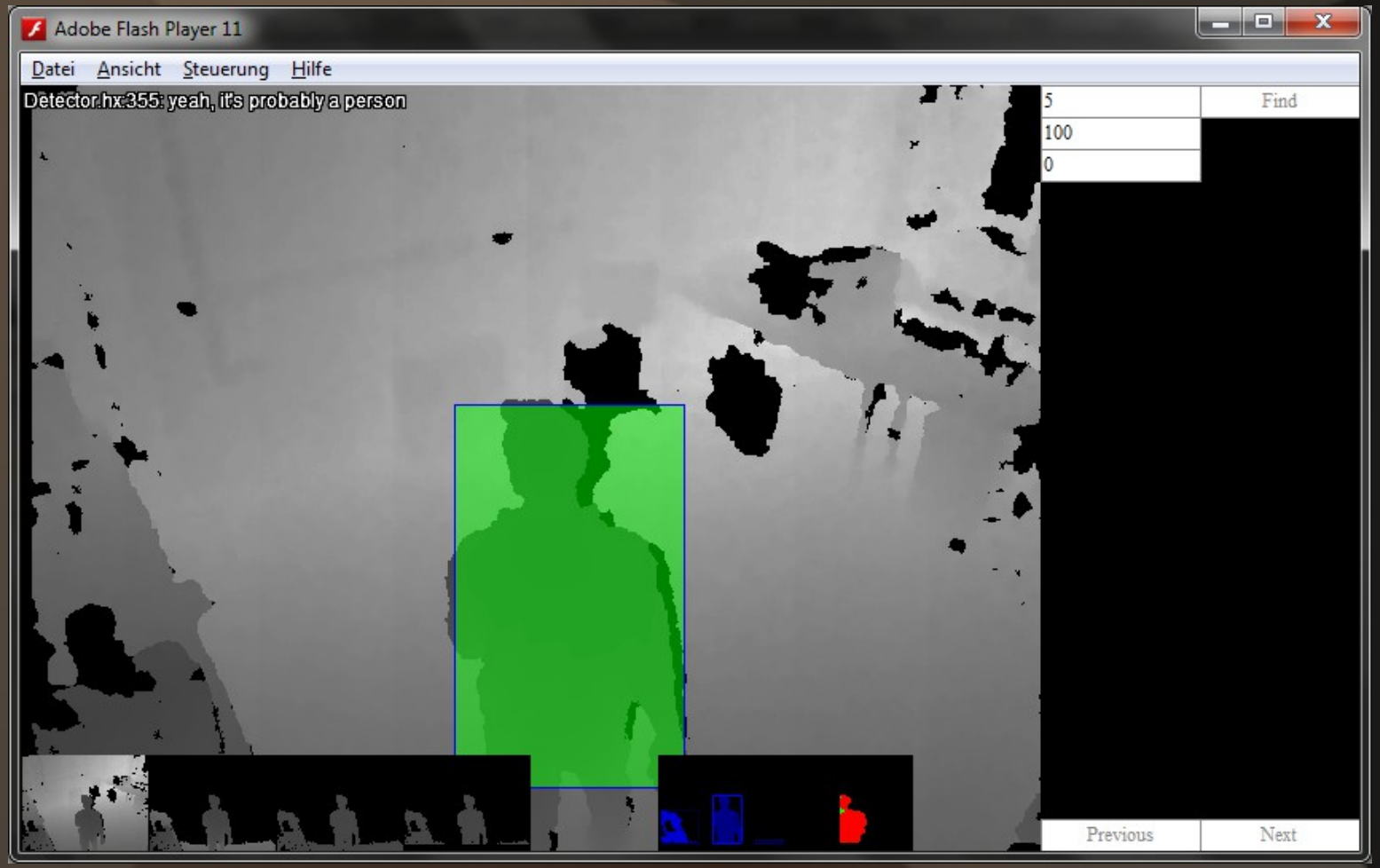
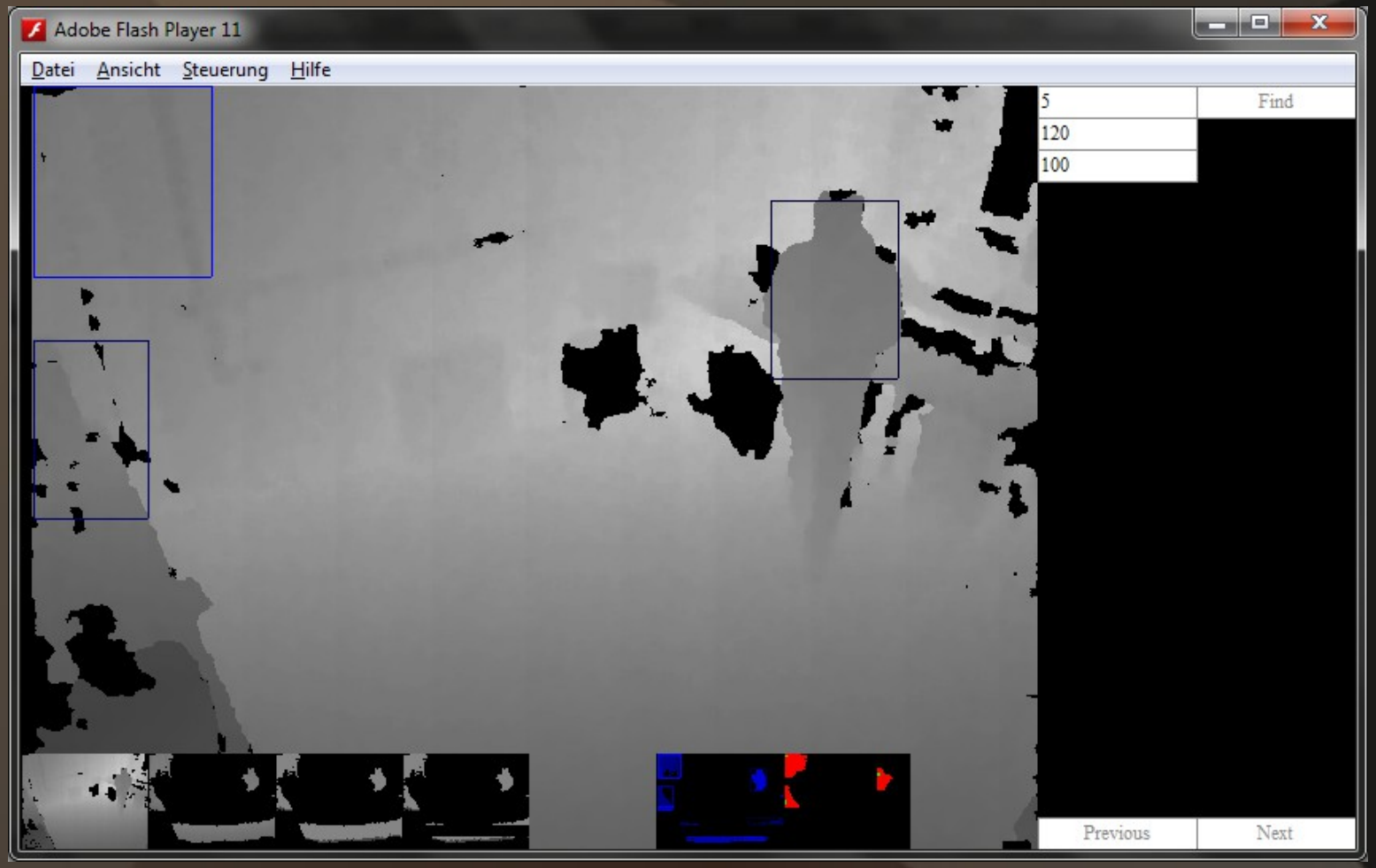
Images (4)


Adobe Flash Player 11
Datei Ansicht Steuerung Hilfe
Detector.hx:355: yeah, it's probably a person
5
Find
100
0
Previous
Next

Images (5)

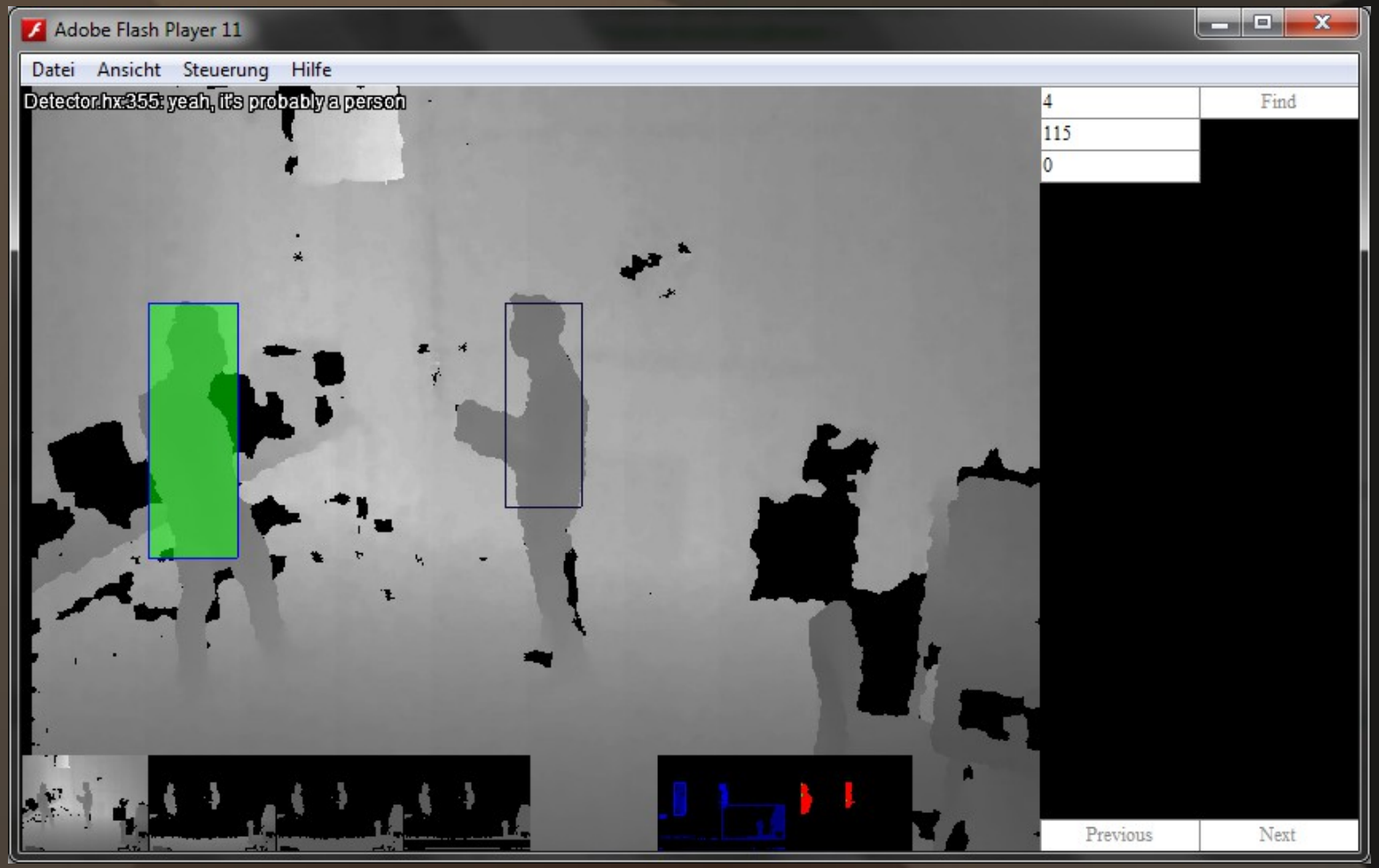


Too far away, too small to predict.

Images (5)

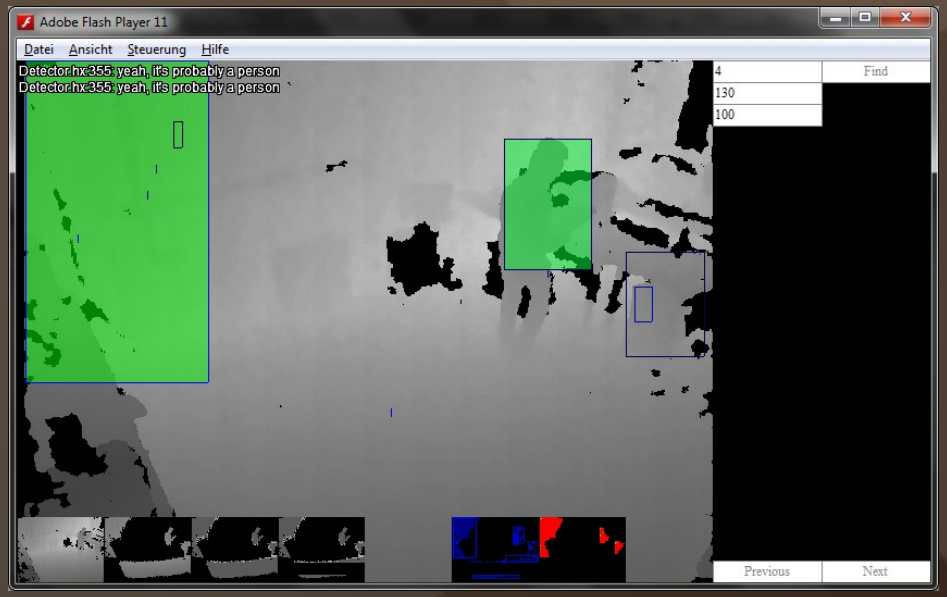
Same as the previous case.

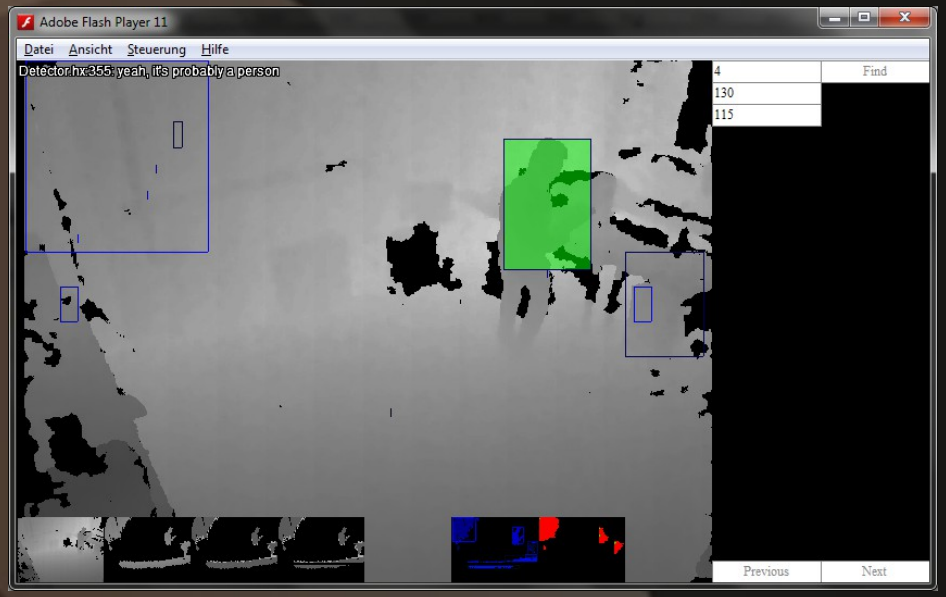
Images (5)



Head and body almost the same width.

Images (5)





Human validation method is not perfect.