

Make it to learn it!

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Radboud Universiteit



Design-Based Education

Making artefacts



Learning concepts

Challenges

Making artefacts

How it facilitate?

How to incorporate?

Learning concepts

How to monitor, trace, and test this learning in an authentic way?

An NRO project

Formative assessment of conceptual development in design-based education in secondary school



Radboud Universiteit



A consortium
of 12 schools

Radboud Universiteit



Agenda

- Exploring participants' design-related experience
- Completing the image processing tool
- Reflection on the activity
- Sharing practical findings from two design projects
- Design-based education from a more theoretical perspective
- Q&A

1

Your design Objectives

2

Your knowledge about students influencing your design projects

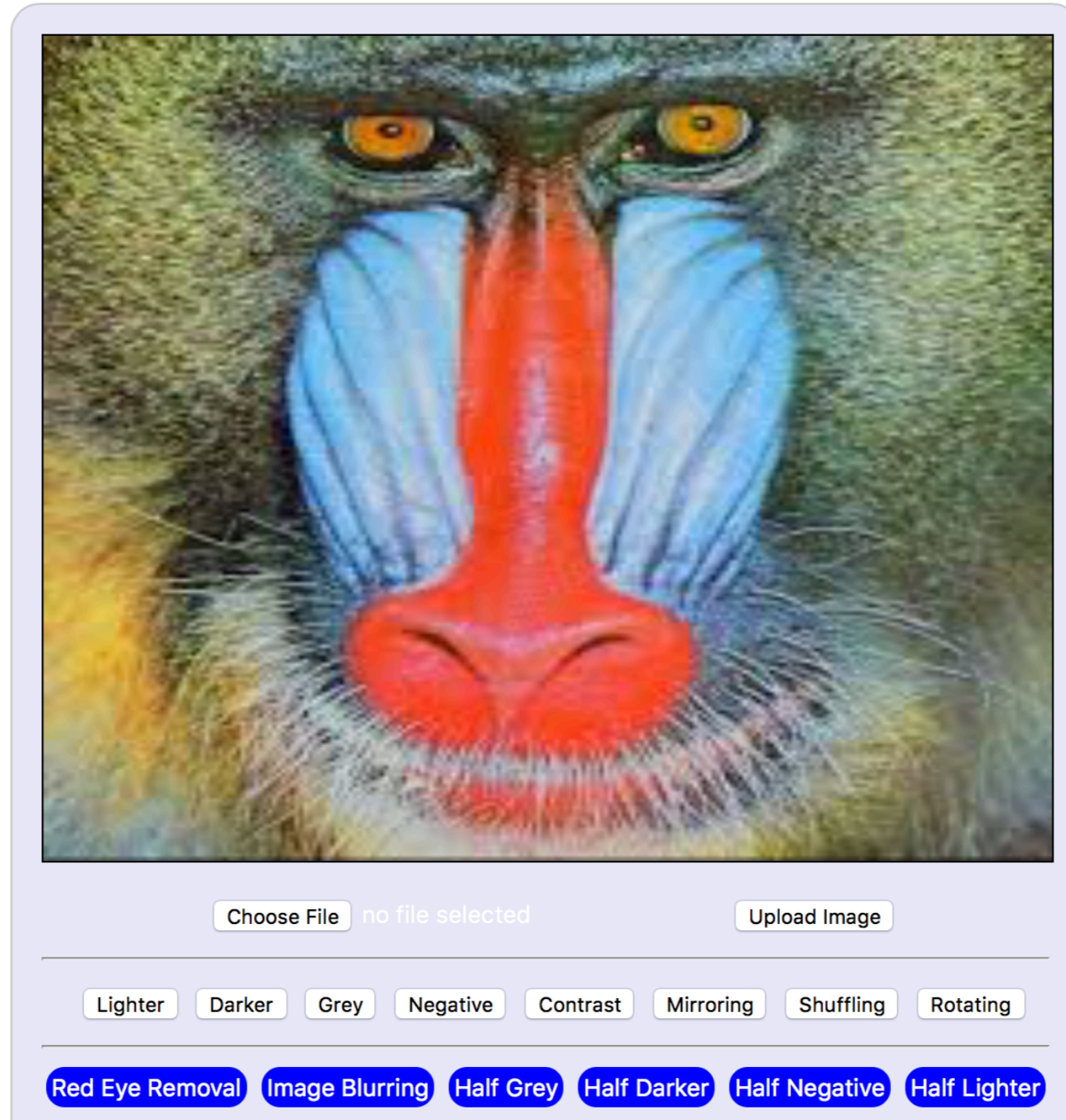
Your instructional strategies

3

Your assessment strategies

4

Design assignment: completing an image processing tool



Opdracht 1: Rode ogen verwijderen



Opdracht 2 – Half zwart-wit



Opdracht 3 – Half donkerder



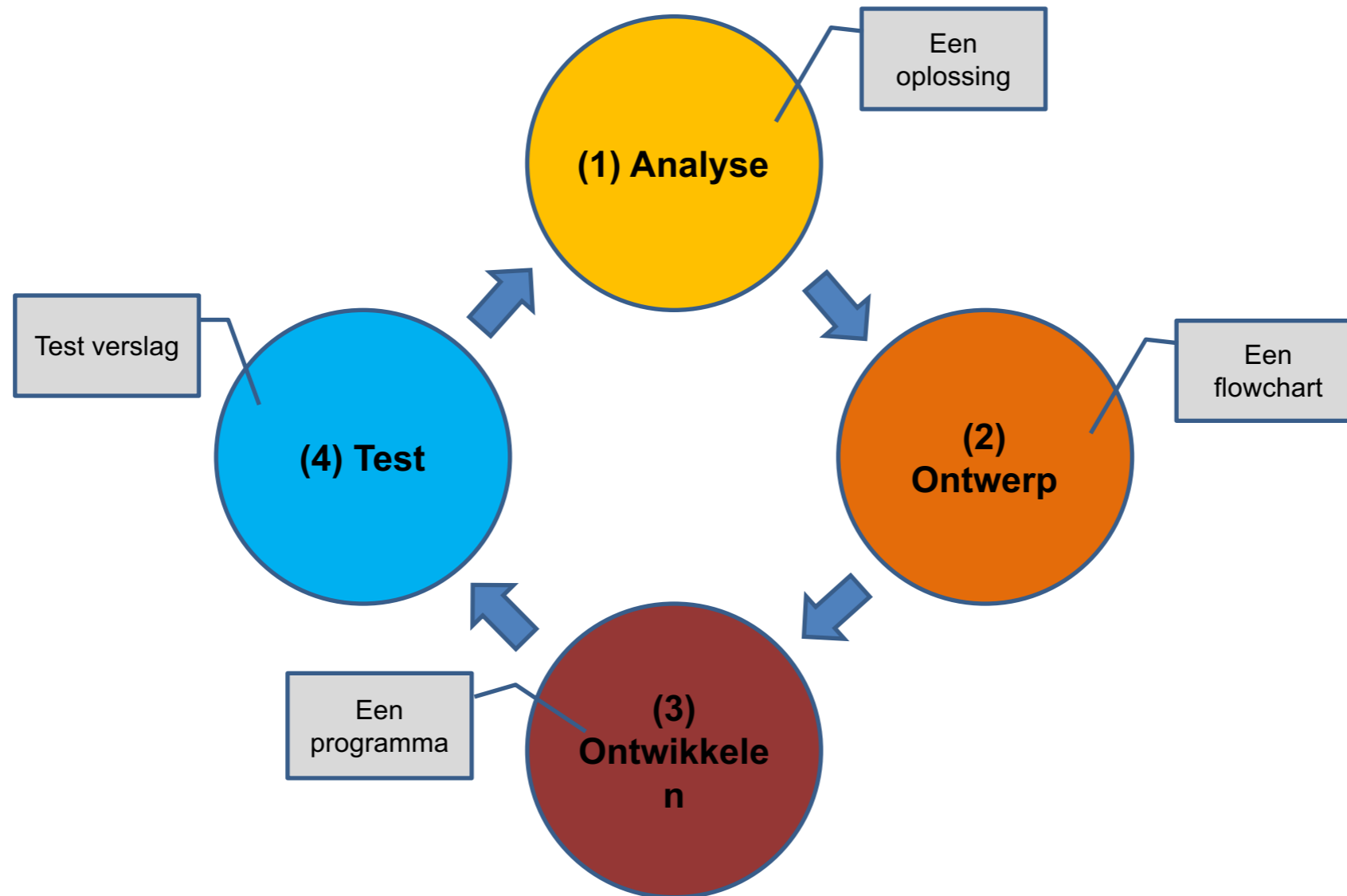
Opdracht 4 – Half Negative



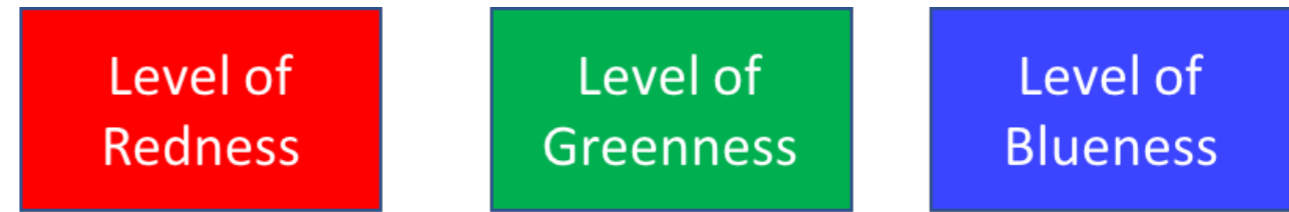
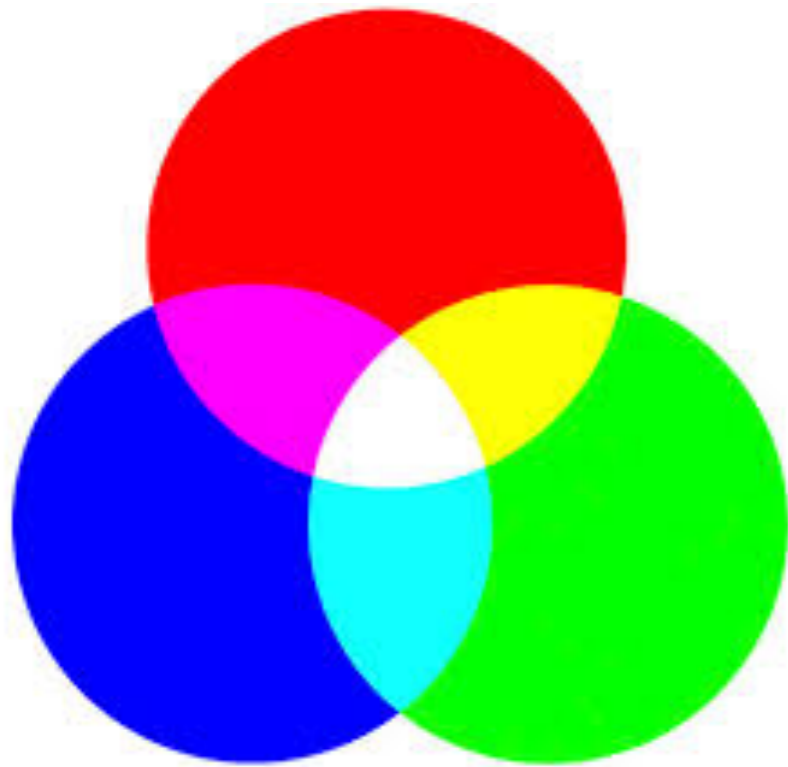
Opdracht 5 – Half Lichter



The design process



The RGB model



RGB (x,y,z)
 $0 \leq x, y, z \leq 255$

Online **RGB** calculator

https://www.w3schools.com/colors/colors_rgb.asp

Analysis of the assignment

Assignment title

Two applications

-
-

High level solution

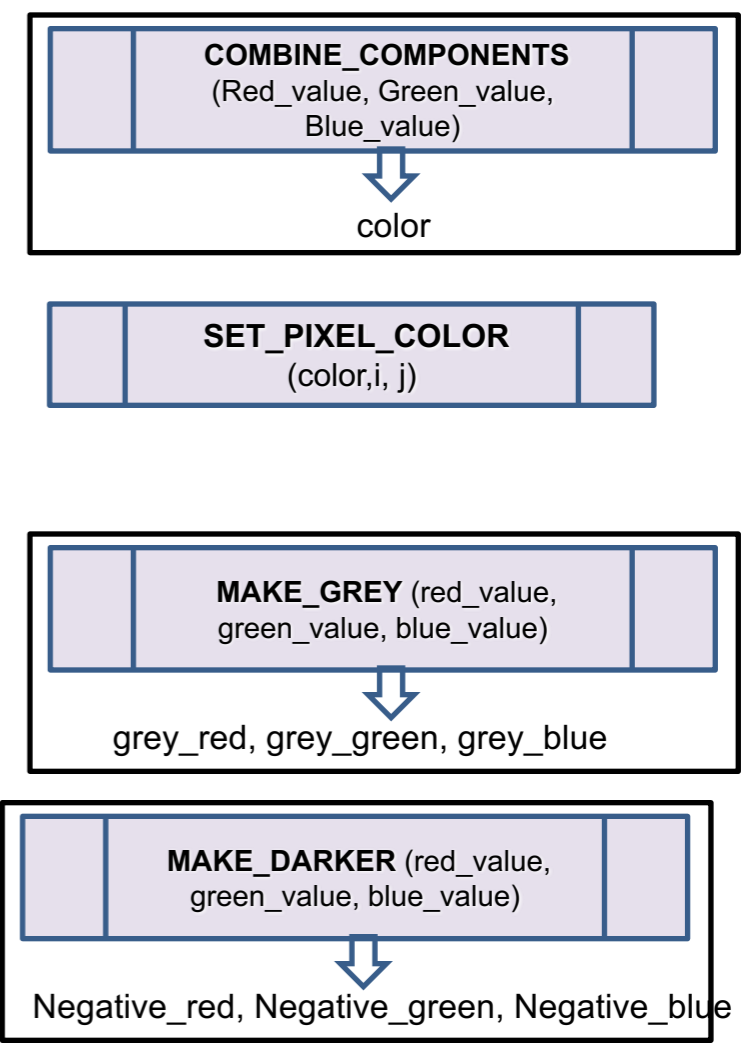
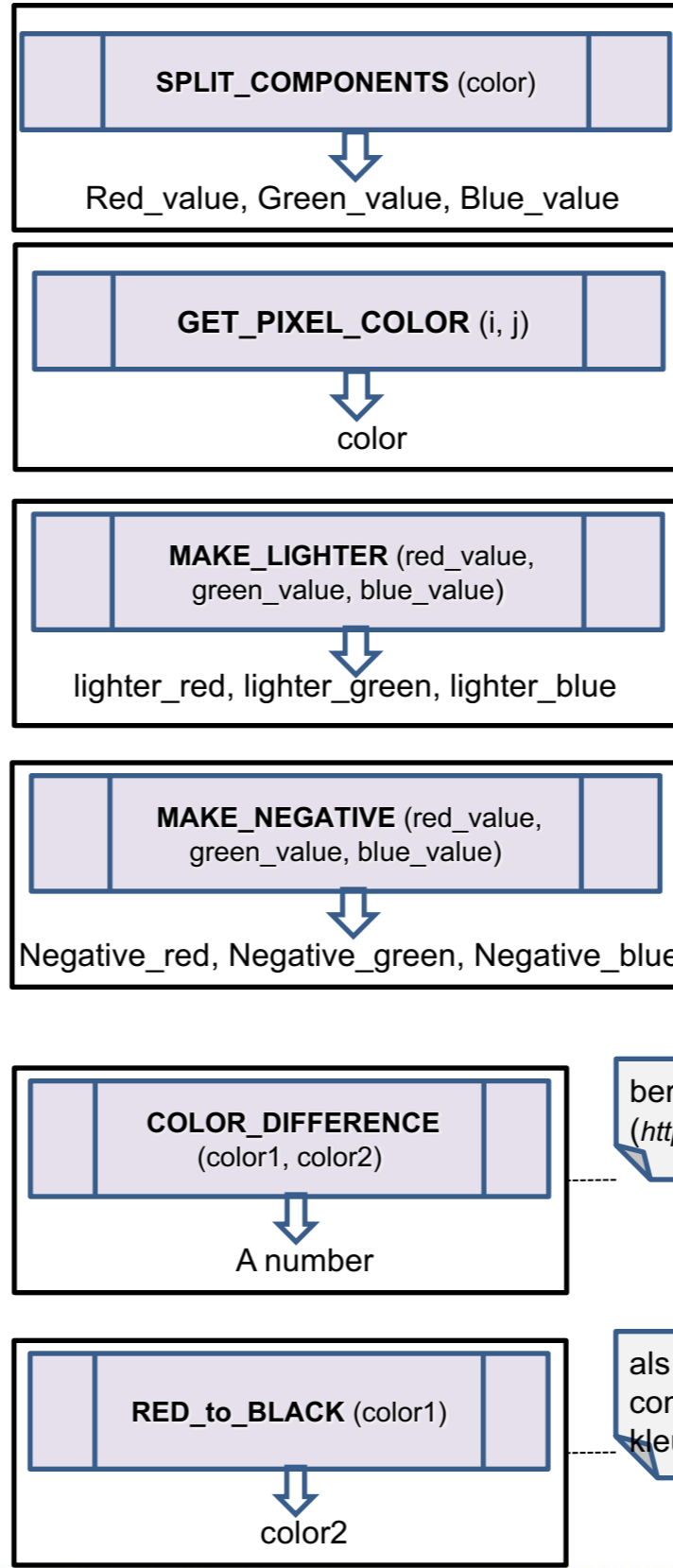
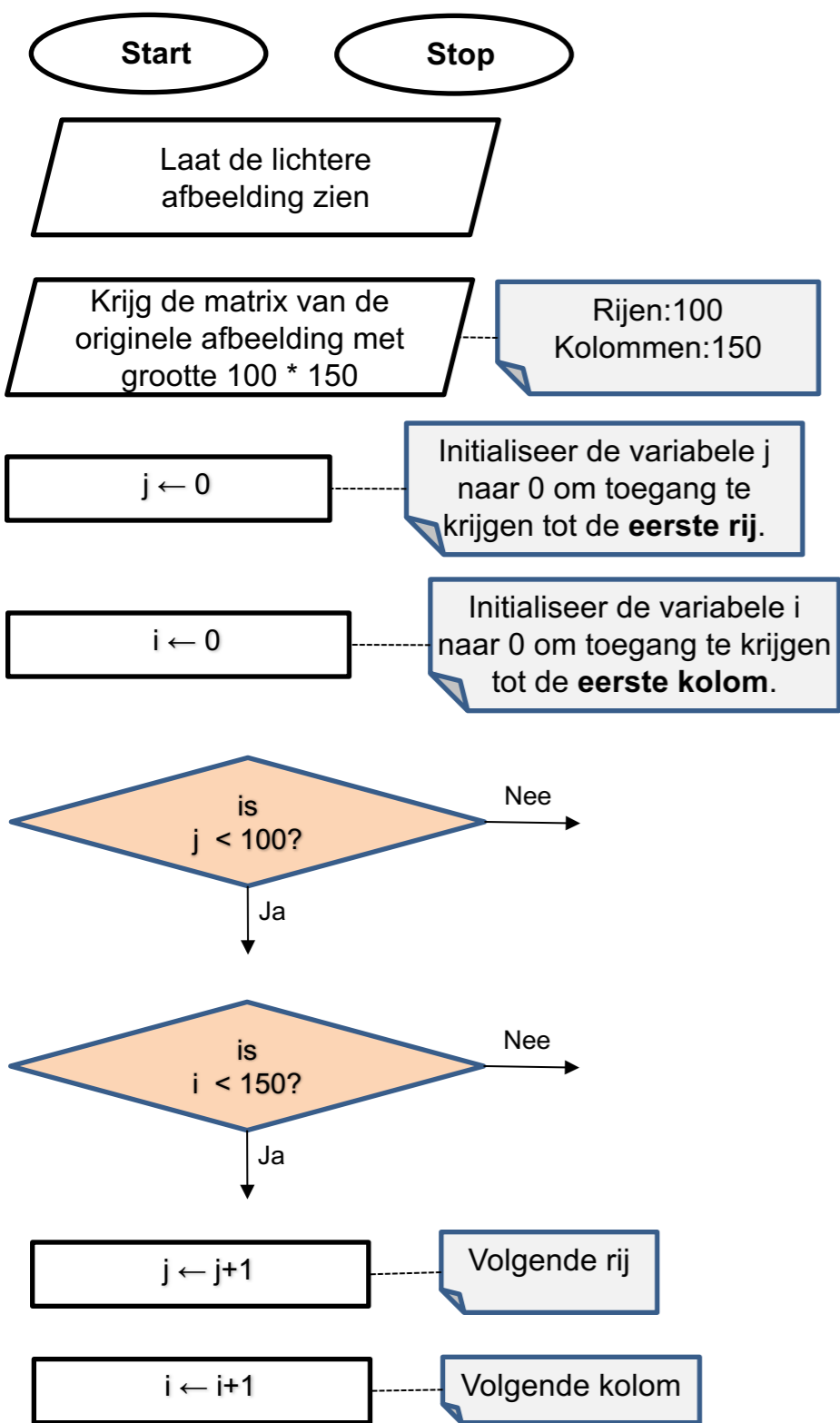
Input

Output

Sub-problems

Make your flowchart





berekent de afstand tussen color1 en color2.
(<https://www.mathsisfun.com/algebra/distance-2-points.html>)

als color1 rood is of bijna rood, converteer het dan naar een zwarte kleur, color 2.



Gallery walking

Program

```
function MAKE_LIGHTER_COMPONENTS($original_red, $original_green, $original_blue)
// making a pixel color lighter
{
    $increasing_factor = 1.20;

    $lighter_red = $original_red;
    $lighter_green = $original_green;
    $lighter_blue = $original_blue;

    /*
    write your code here

    */

    return array(round($lighter_red), round($lighter_green), round($lighter_blue));
}
Make_Lighter
```

```
function grey_pixel ($original_red, $original_green, $original_blue)
{
    $new_red = $original_red;
    $new_green = $original_green;
    $new_blue = $original_blue;

    /*
    write your code here
    */

    return array(round($new_red), round($new_green), round($new_blue));
}
Make_GREY
```

```
function darker_pixel ($original_red, $original_green, $original_blue)
{
    $decreasing_factor = 0.7;

    $darker_red = $original_red;
    $darker_green = $original_green;
    $darker_blue = $original_blue;

    /*
    write your code here
    */

    return array(round($darker_red), round($darker_green), round($darker_blue));
}
Make DARKER
```

```
function negative_pixel ($original_red, $original_green, $original_blue)
{
    $negative_red = $original_red;
    $negative_green = $original_green;
    $negative_blue = $original_blue;

    /*
    write your code here
    */

    return array($negative_red, $negative_green, $negative_blue);
}
Make_NEGATIVE
```

```
function red_eye_removal_pixel ($original_red,$original_green,$original_blue)
{

    $t = colordistance (255,0,0,$original_red,$original_green,$original_blue);
    $new_red = $original_red;
    $new_green = $original_green;
    $new_blue = $original_blue;

    /*
    write your code here
    */

    return array($new_red, $new_green, $new_blue);
}
RED_to_BLACK
```


1

Your design Objectives

2

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Your instructional strategies

3

Your assessment strategies

4

Practical insights from running the project

Formative Assessment

Peer-assessment

Interviews

Messing Up

Debate

Need to Do

Poster Session

Understand Challenge



Present & Share

Plan Design (Use Science)



Design/Redesign Cycle



Analyze & Explain

Present & Share



Construct & Test



Clarify Question



Present & Share

Make Hypothesis



Investigation/Exploration Cycle



Analyze Results

Design Investigation



Conduct Investigation



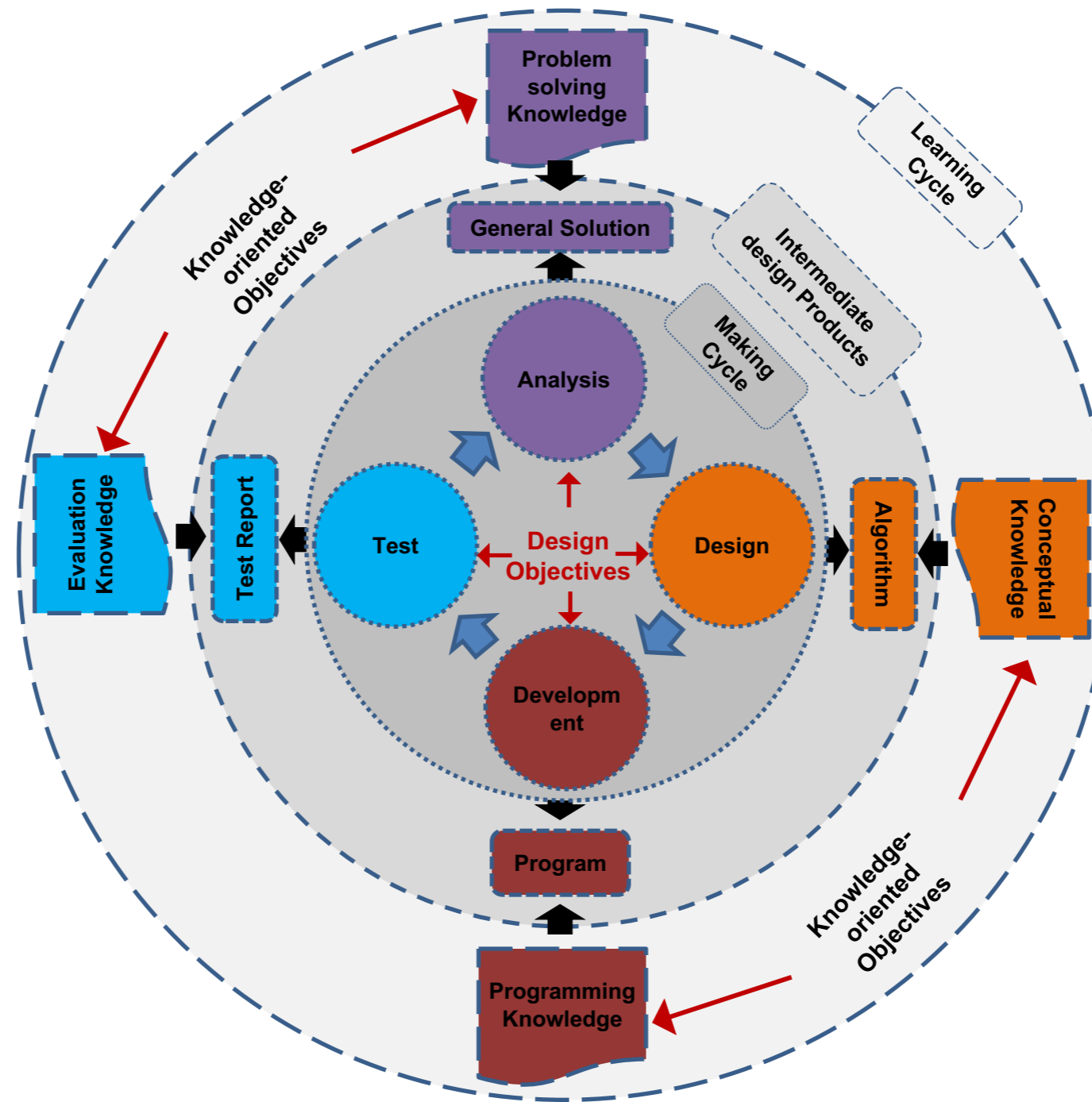
Need to Know

Gallery Walk

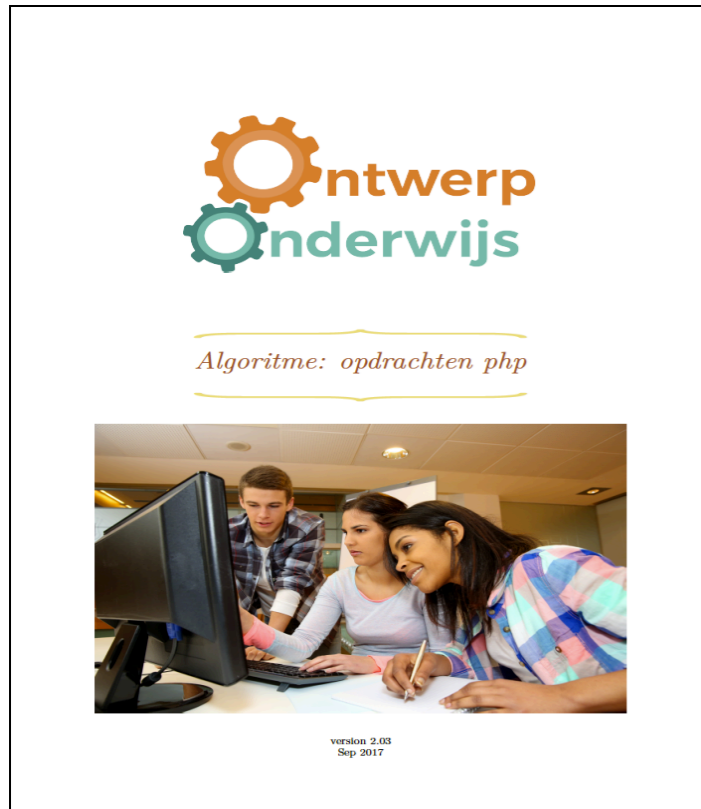
Testing of intermediary design products

Design Diaries

The instructional model




The developed course materials

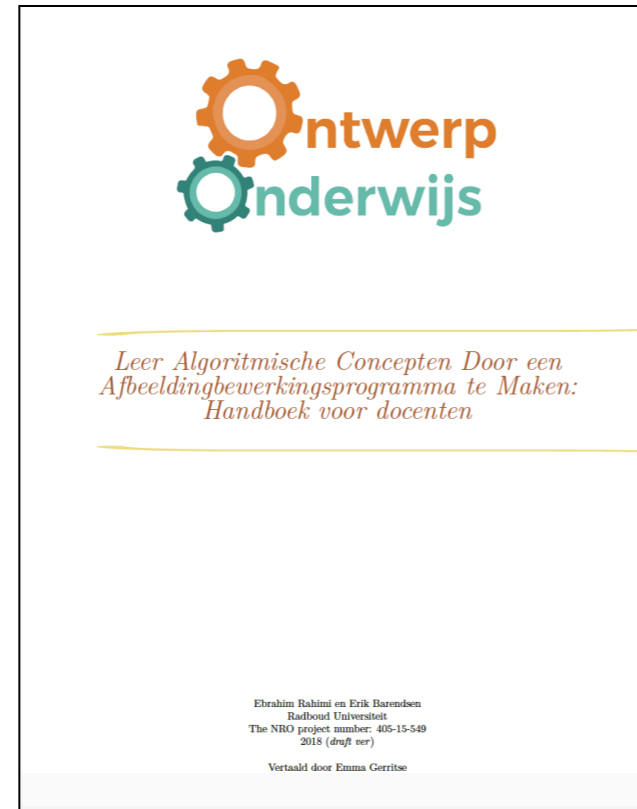


**Ontwerp
Onderwijs**

Algoritme: opdrachten php



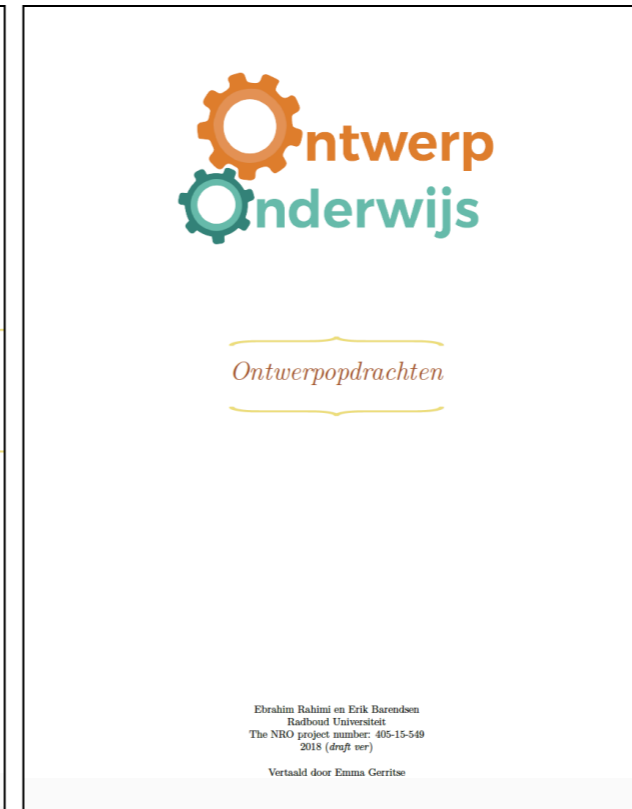
version 2.03
Sep 2017



**Ontwerp
Onderwijs**

*Leer Algoritmische Concepten Door een
Afbeeldingbewerkingsprogramma te Maken:
Handboek voor docenten*

Ebrahim Rahimi en Erik Barendsen
Radboud Universiteit
The NRO project number: 405-15-549
2018 (draft eer)
Vertaald door Emma Gerritse



**Ontwerp
Onderwijs**

Ontwerpopdrachten

Ebrahim Rahimi en Erik Barendsen
Radboud Universiteit
The NRO project number: 405-15-549
2018 (draft eer)
Vertaald door Emma Gerritse



**Ontwerp
Onderwijs**

*concepte document: Introductie over
algoritme*

2016

Realistic design assignments

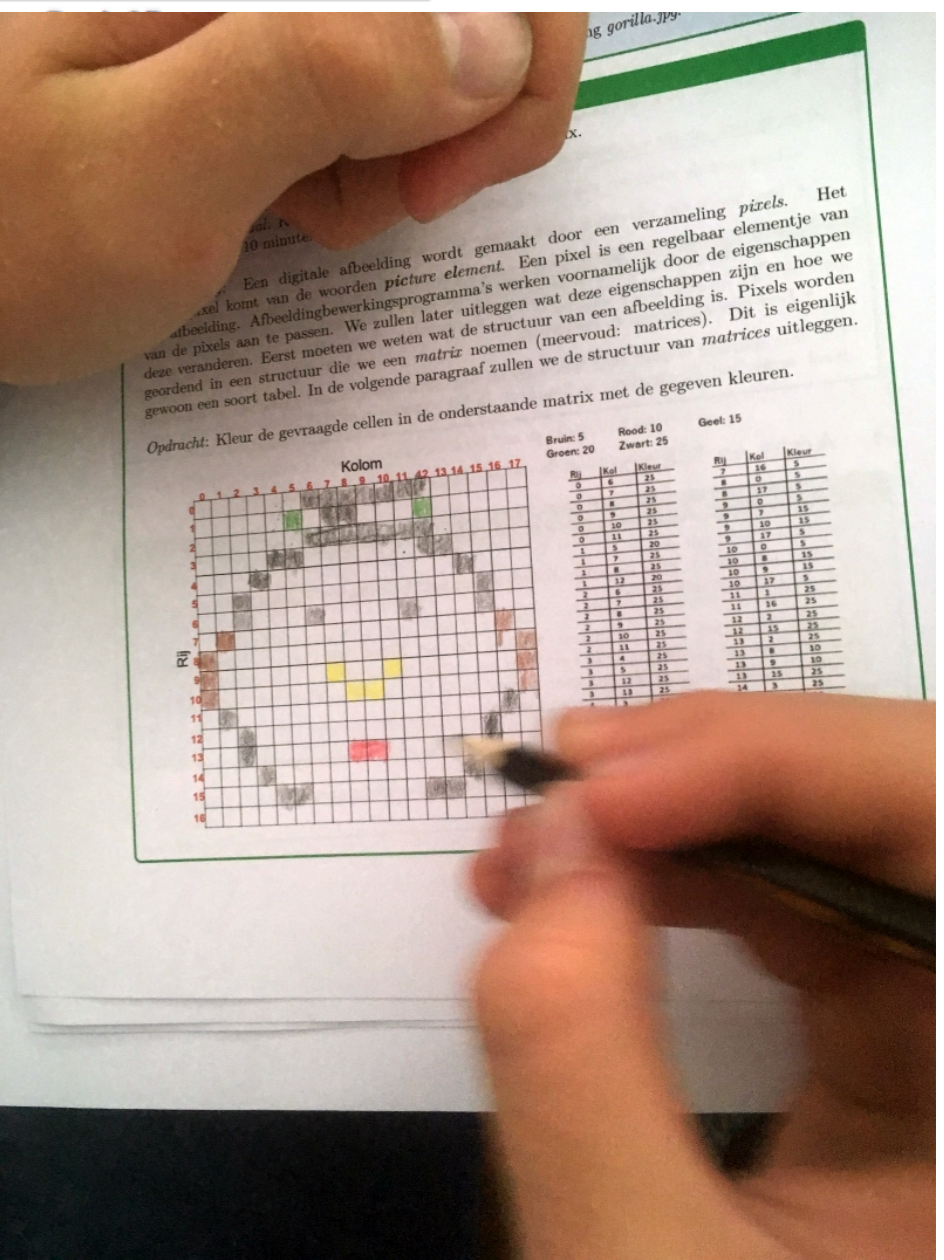
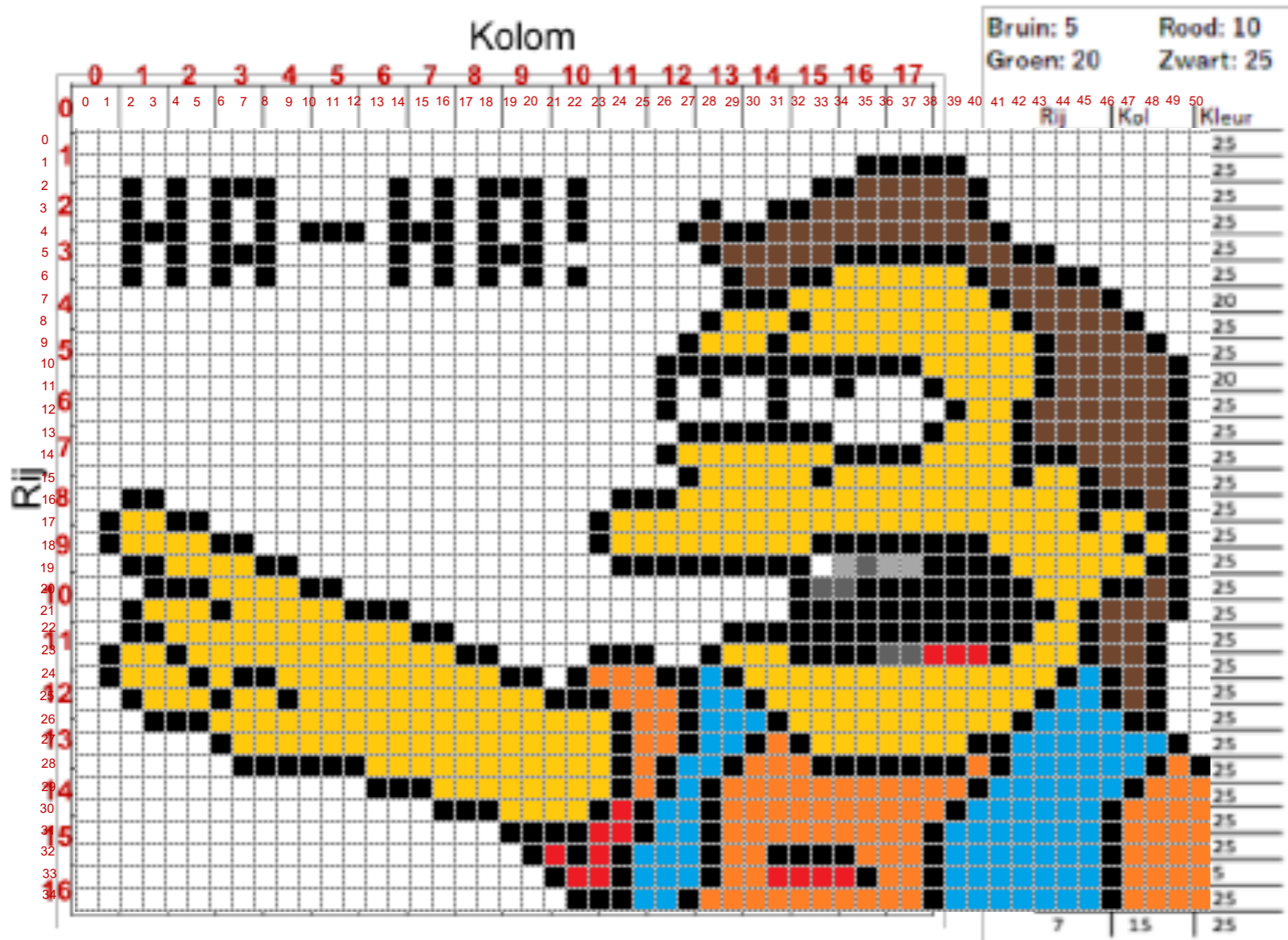
Text processing

- Calculate the similarity percentage of two text
- Perform sentiment analysis on a given text,
- Identify valid URLs in a text,
- Identify valid e-mail addresses in a text
- Free assignment

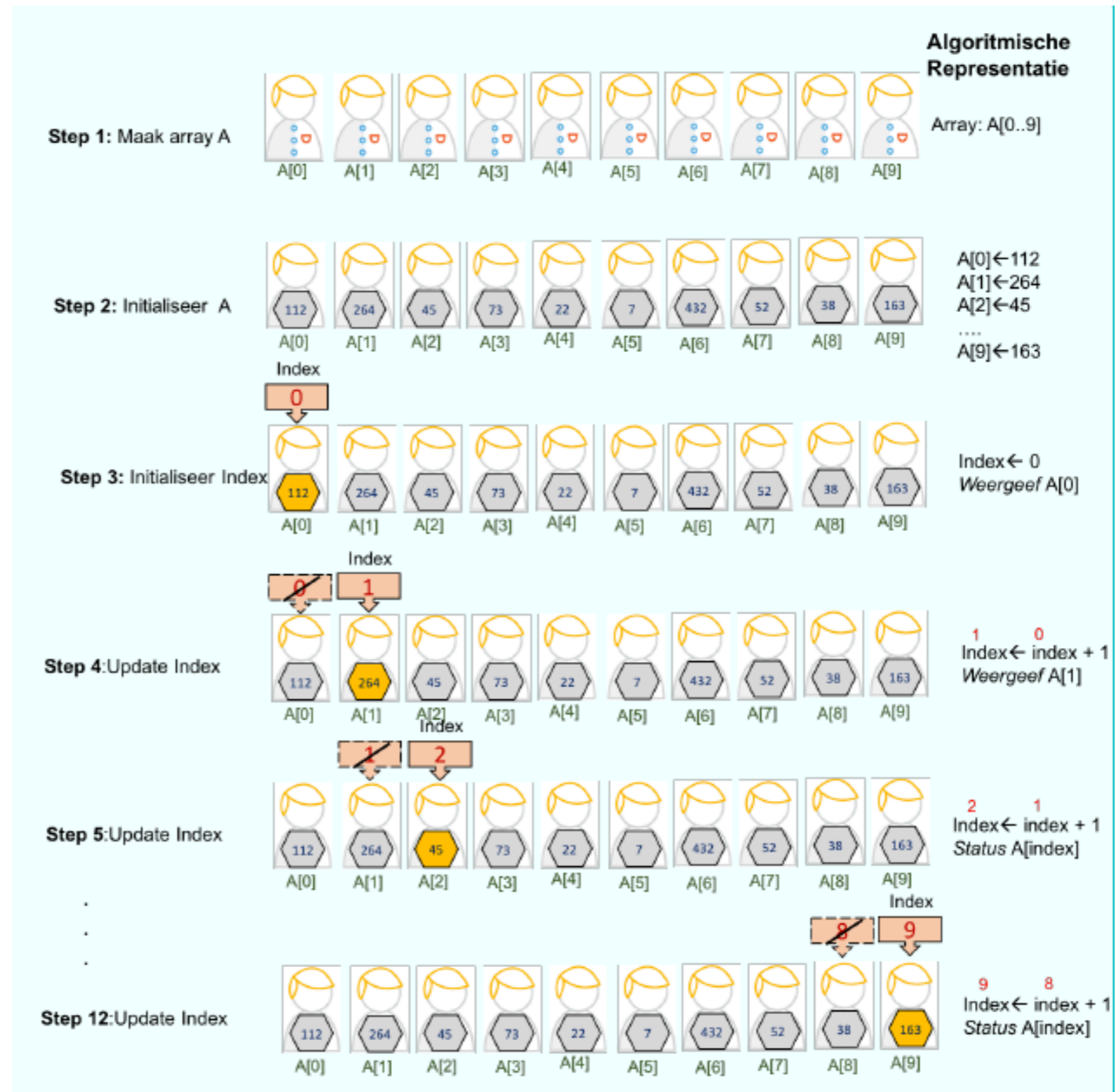
Image processing

- Removing red eyes
- Making an image lighter, darker, negative
- Image mirroring

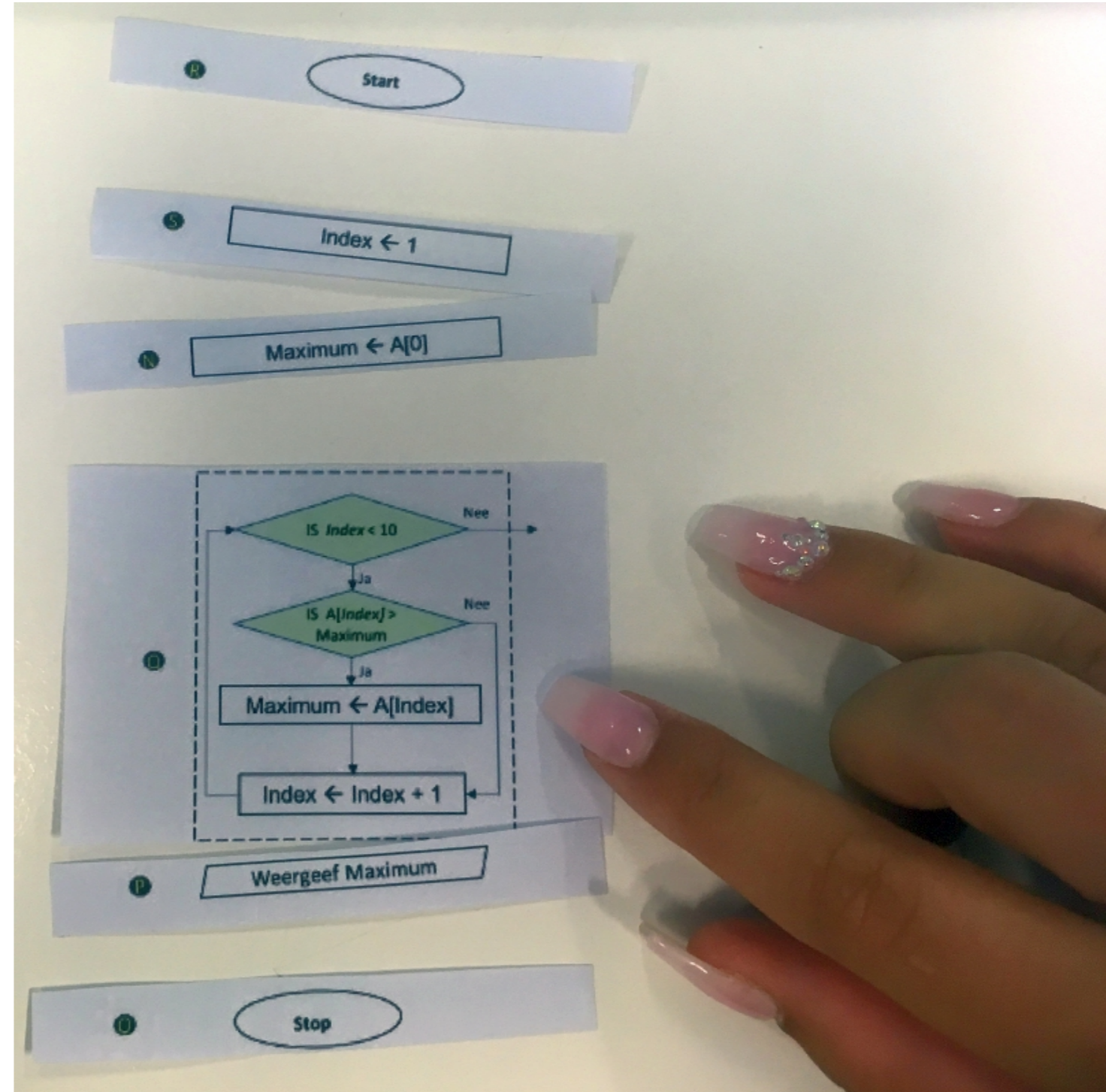
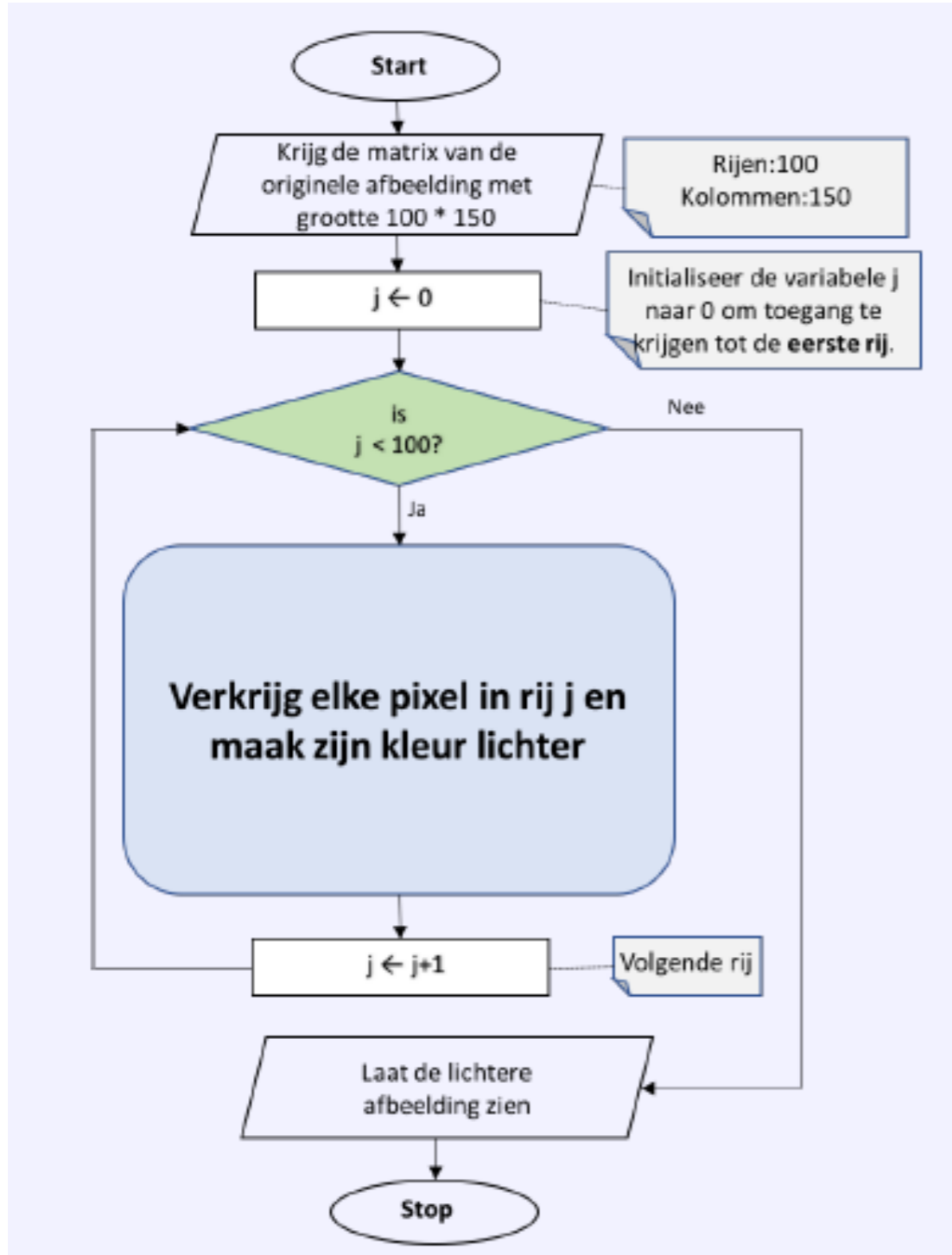
Unplugged activities



Unplugged activities



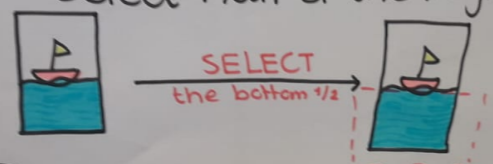
Completion-based strategy



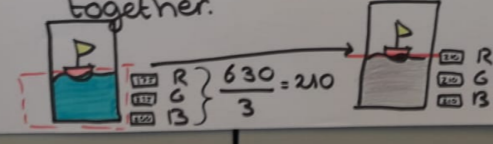
Do it yourself
Discuss it with peers
Share it with class

Vera Ilse
1/2 B&W
Rebecca Roos

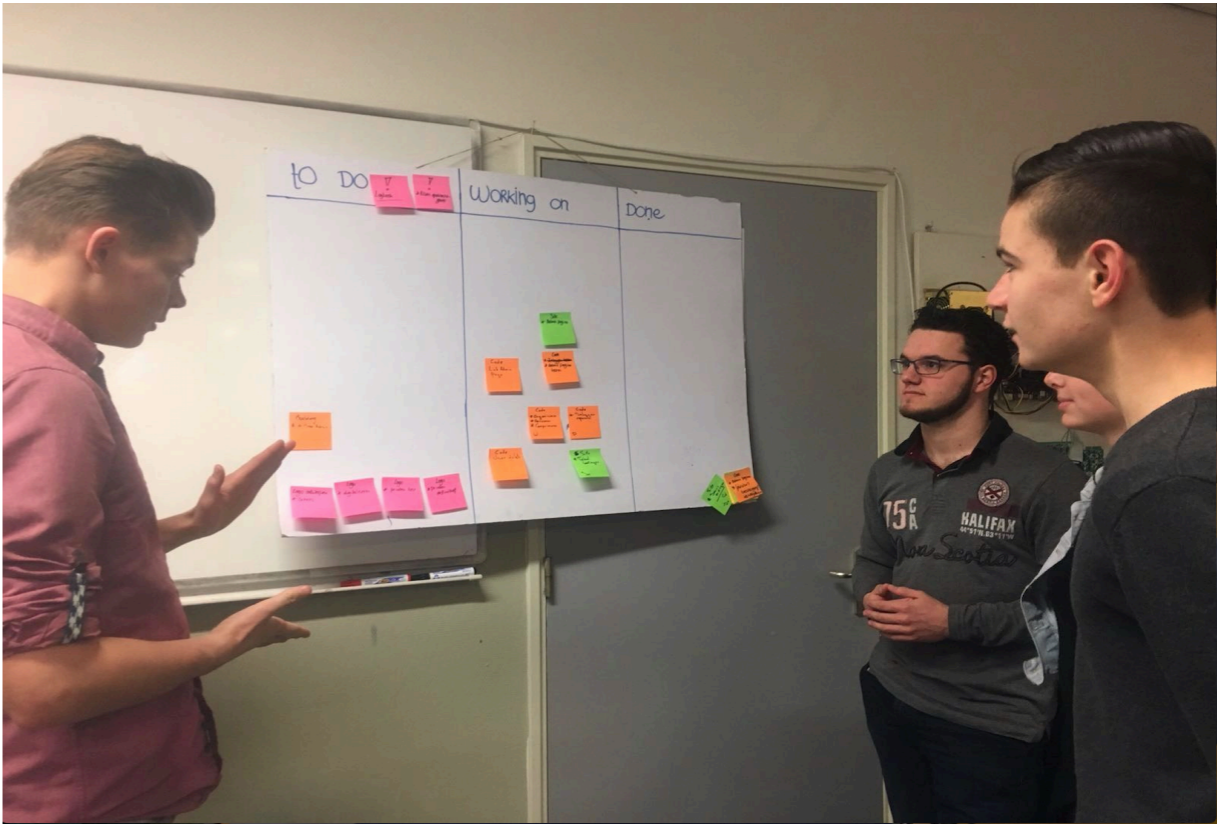
1 Make the program
Select half of the image.



2 Make sure the RGB-value of every pixel in the bottom half of the picture gets divided by "3" after you count all of the values together.



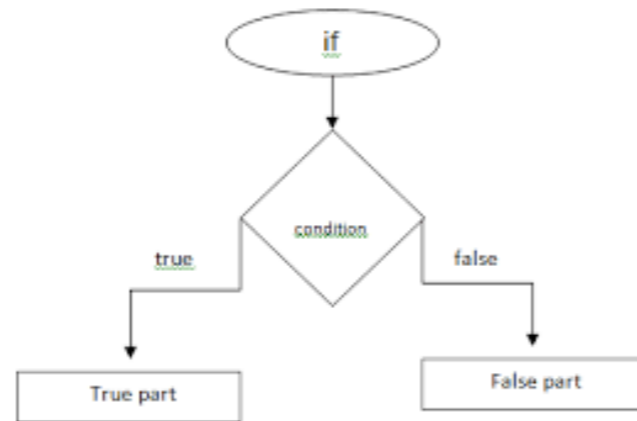
Hoe selecteer je de helft van de afbeelding?
• pixels om
• Lenna, du dit toe
• pixel



Algorithmic concepts



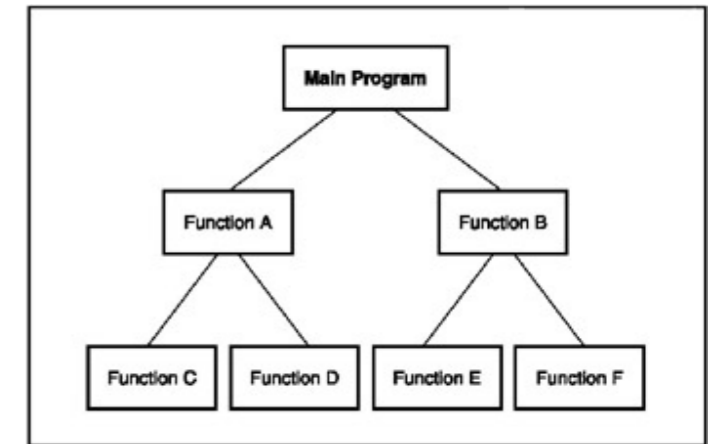
Sequence



Condition



Iteration



Subroutine

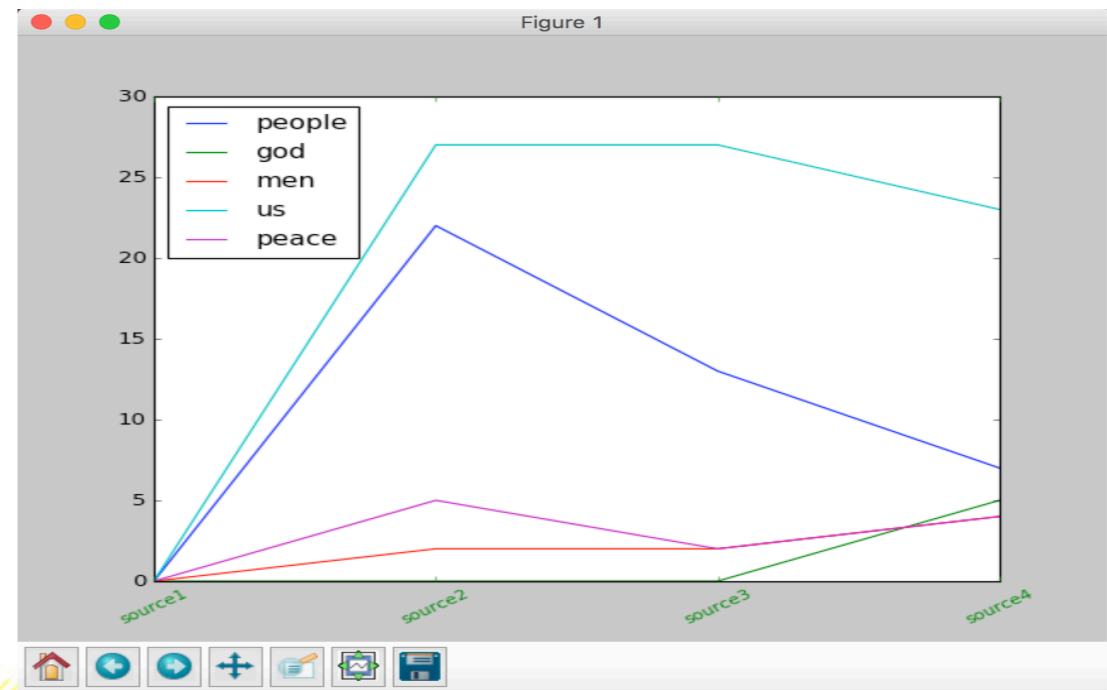
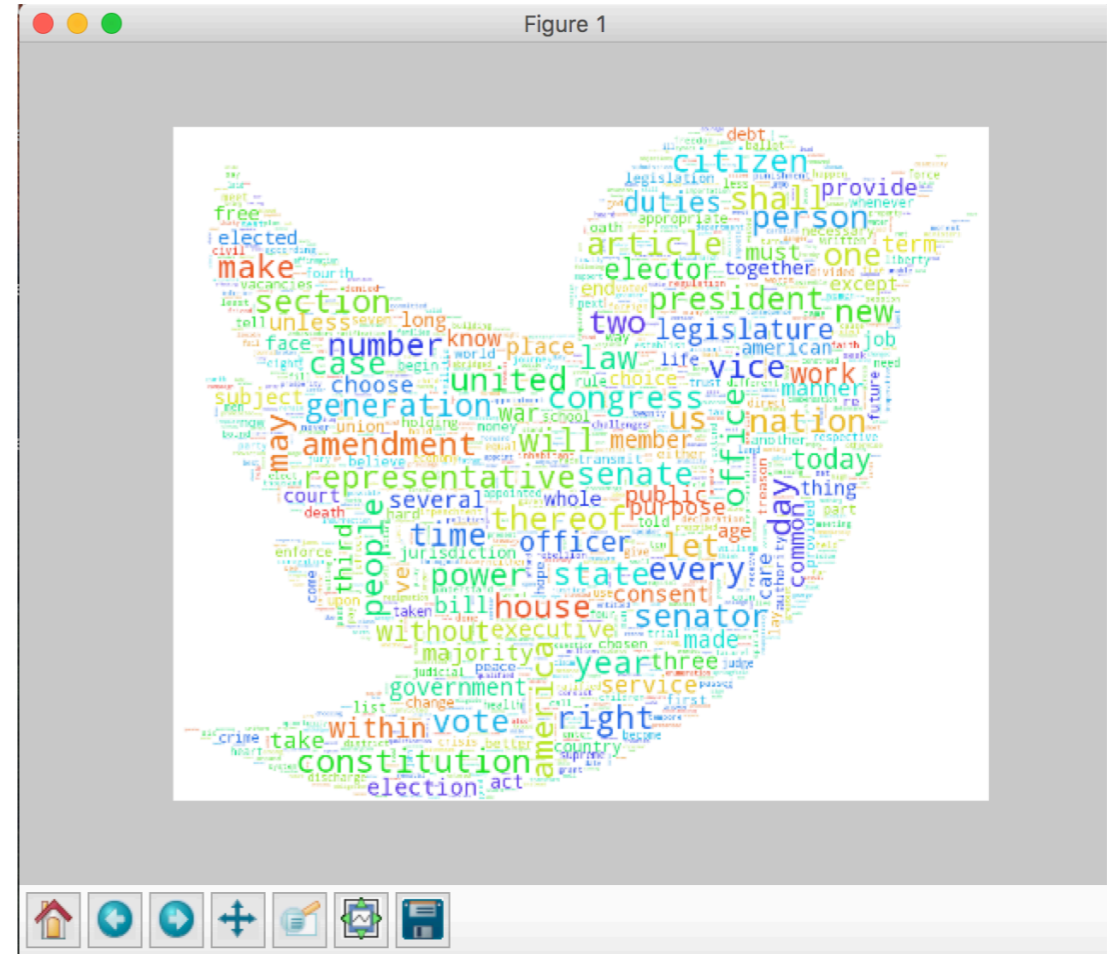
Supporting tool for text processing

Type text:

Text file 1: no file selected

Text file 2: no file selected

Website Url:



Supporting tool for image processing



Choose File no file selected

Upload Image

Lighter Darker Grey Negative Contrast Mirroring Shuffling Rotating

Red Eye Removal Image Blurring Half Grey Half Darker Half Negative Half Lighter



What's next:

- ❑ Polishing & Improving the course materials
- ❑ Website: sharing the materials *www.ontwerponderwijs.nl*
- ❑ 15 March 2019: bèta-ontwerpevent event

GEEF ONTWERPEN
EEN PLEK IN JOUW
BÈTAVAK



BOE BÈTA
ONTWERP
EVENT

VRIJDAG 15 MAART 2019

BOE BÈTA
ONTWERP
EVENT

Geef ontwerpen een plek in
jouw bètavak. Hoe kun je
leerlingen laten leren (door)
ontwerpen? Je leert en wordt
geïnspireerd over:

- Ontwerpen en ontwerpvaardig-
heden in de bètawereld.
- Hoe je een ontwerples
(praktisch) vorm kan geven.
- Hoe formatieve toetsing leren
tijdens ontwerpen stimuleert.

Het BètaOntwerpEvent is
een eendaagse conferentie
over ontwerp onderwijs in
het bètavakgebied.

- **OP** Vrijdag 15 maart
- **WAAR** Utrecht
- **VOOR** Docenten HAVO
en VWO in een bètavak
(incl. informatica)
- **MEER?**
ontwerponderwijs.nl

SAVE THE DATE

VRIJDAG 15 MAART 2019

TUDelft

Radboud University



NRO
NATIONAAL REGIEORGAAN
ONDERWIJS ONDERZOEK

Radboud Universiteit



Thanks for your attention!

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ebrahim@science.ru.nl