



TWC/29/27

ORIGINAL: English

DATE: May 30, 2011

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

**TECHNICAL WORKING PARTY ON AUTOMATION AND
COMPUTER PROGRAMS**

Twenty-Ninth Session
Geneva, June 7 to 10, 2011

IMAGE ANALYSIS IN THE CZECH REPUBLIC

Document prepared by an expert from the Czech Republic

Image analysis in UKZUZ (Czech Republic)

David Hampel



29. TWC UPOV
6.–10. 6. 2011, Geneva

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Topics

1. Main goals
2. Hardware, software
3. Practical experience
4. Improvements

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Main goals

- ▶ To replace „by hand“ measurements by image analysis for suitable crops and characteristics.
 - ▶ Saving of working powers.
 - ▶ Greater precision.
 - ▶ Elimination of human factor errors.
- ▶ To archive images of plant material.
- ▶ To obtain difficult-to-measure characteristics (area, TG pea).
 - ▶ The only way.

Current procedure for crops with many varieties

- ▶ Collection of plant material.
- ▶ Getting 1:1 image by copy machine.
- ▶ When possible: measure images (usually with digital calliper).

Modification of procedure for crops with many varieties

- ▶ Collection of plant material.
- ▶ Getting image by digital camera (scanner).
- ▶ Immediately after getting of the last image: measure with computer-based image analysis.

Software

MATLAB computational system

- ▶ <http://www.mathworks.com/>
- ▶ core + Image analysis toolbox
- ▶ prepared functions can be completed by our specialized procedures (for particular characteristics)

Hardware

Sceye

- ▶ <http://www.sceye.biz/>
- ▶ relatively cheap solution
- ▶ quality of the device: shape analysis is fully possible, color analysis not

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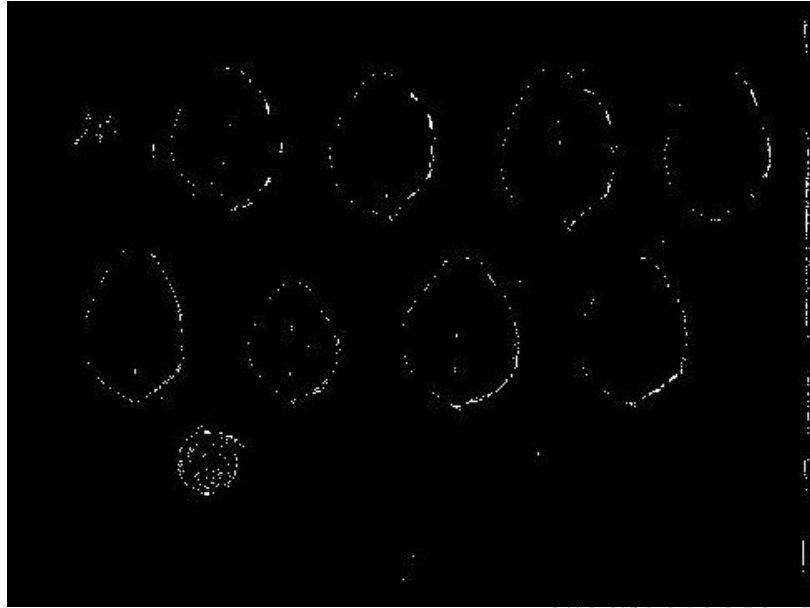
Original (testing) image



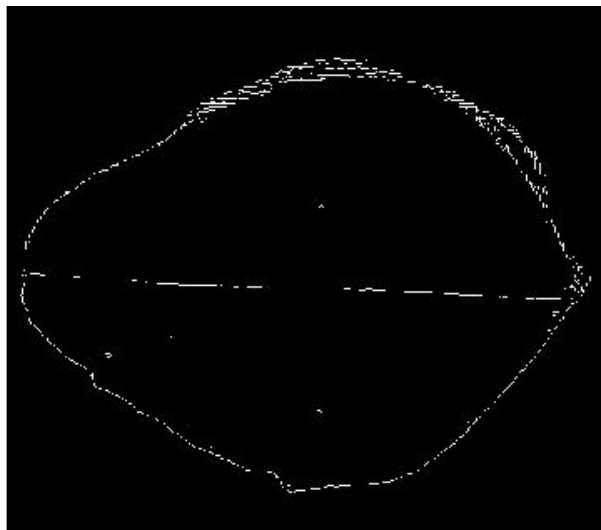
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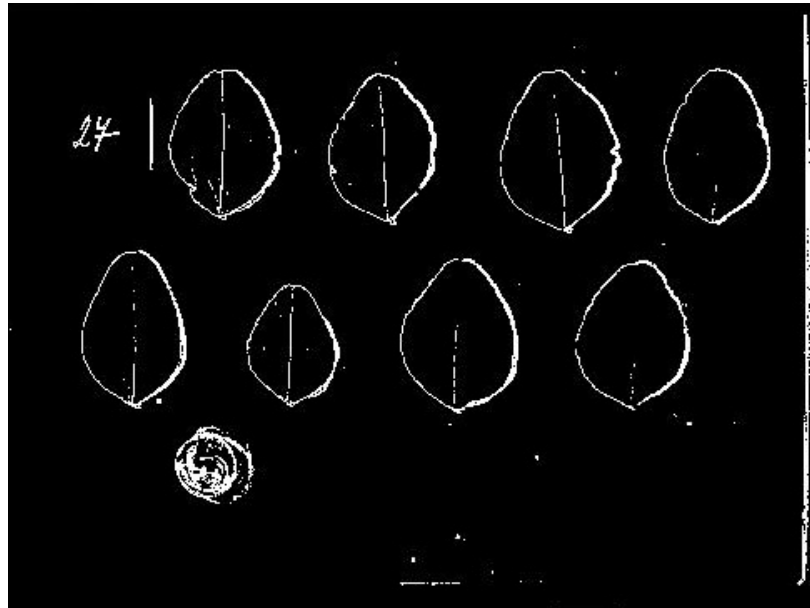
Edges detection



Edges detection – detail



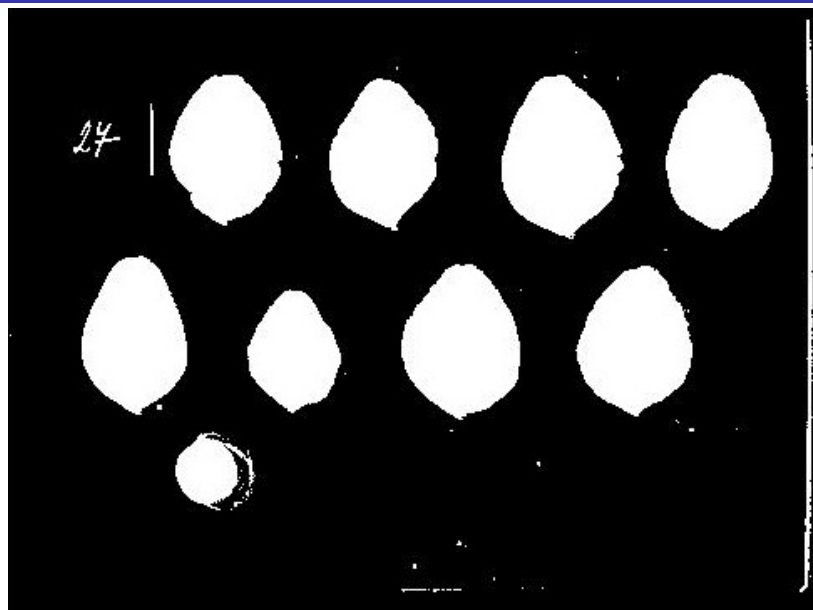
Edges dilatation



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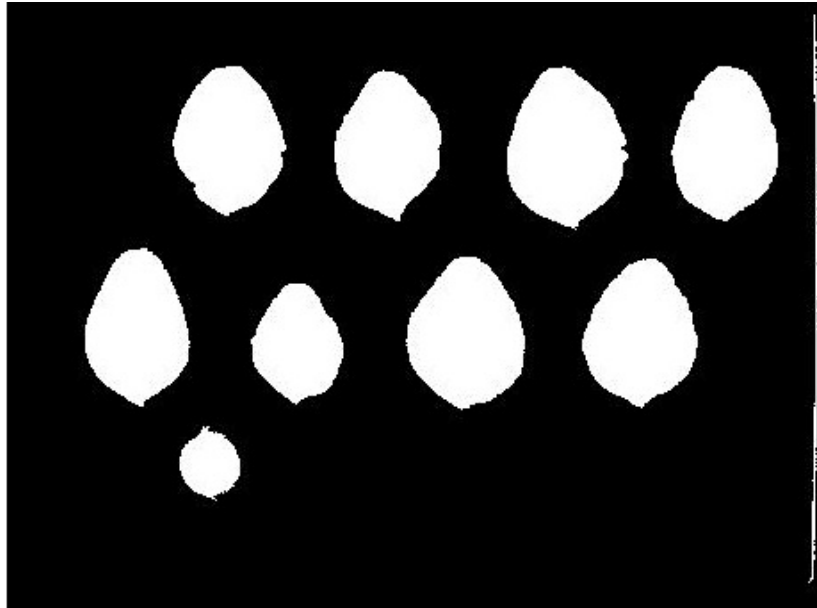
Fill-in holes with continuous borders



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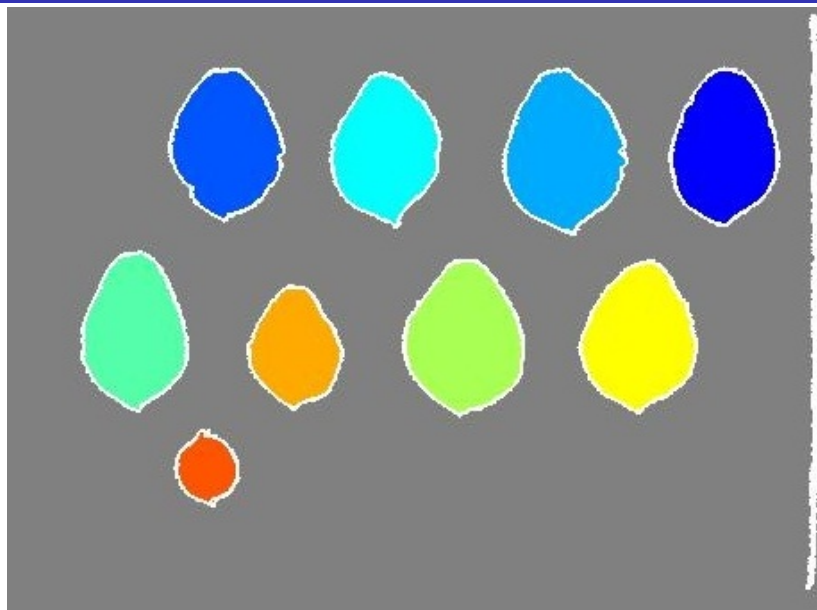
Clean-up of image – erosion



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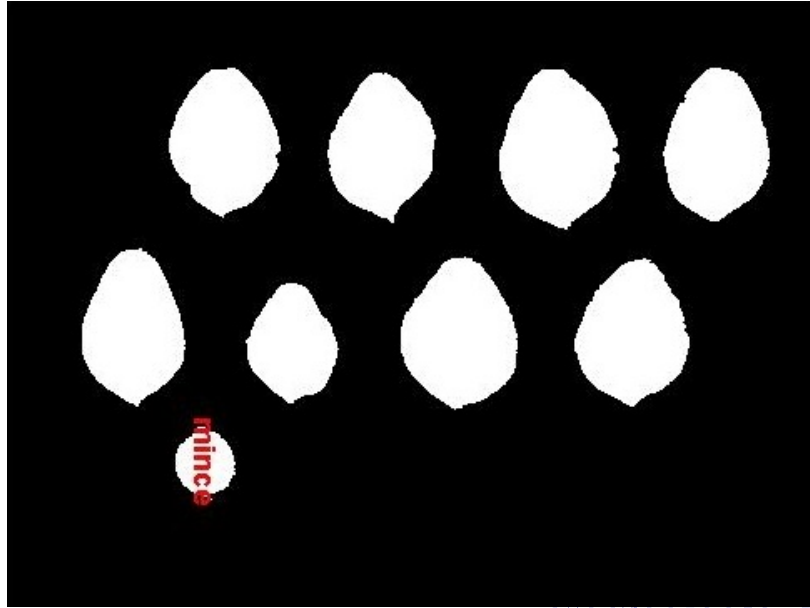
Separation of objects



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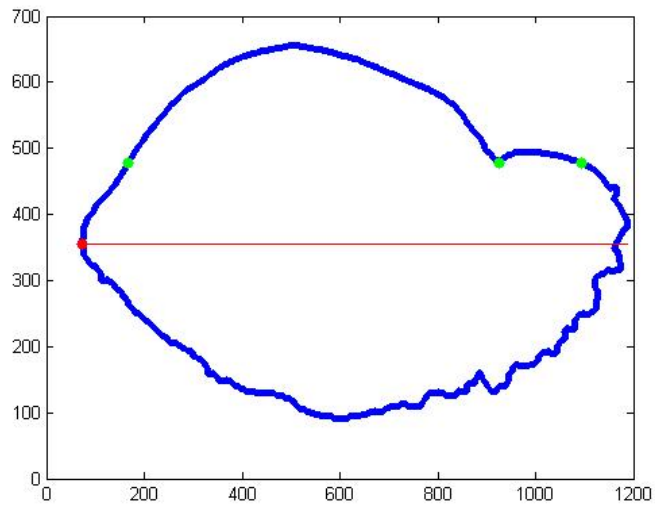
Identification of objects



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Detailed analysis



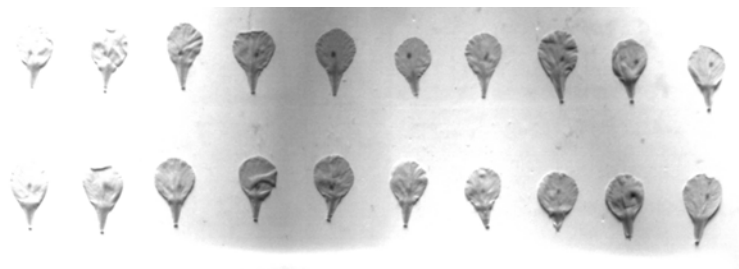
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Problem

Light conditions

- ▶ shade of coin
- ▶ reflections
- ▶ image burn



Solution

- ▶ acquisition of illuminative system "Atlas"
- ▶ better darkening equipment of room
- ▶ better organisation of scanned area

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Preparing of scanned area



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Obtaining images



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Cooperation with private sector – Agritec Šumperk

- ▶ Similar problems like in DUS testing – management of gene collection.
- ▶ For example analysis of the pea seed surface for particular varieties.

Thank you for your attention.