Image analysis / edge detection software

Pinpoint
Photonics

Dispersive PST
PST edge detection

UCLA

improve precision of image based AI

realize long time observation of photo toxic cells

Comparison with previous edge detection software

high contrast area

bold edge at high contrast area

same width (no bold)

low contrast / dark area

different width

same width

original image

processed image by derivative

processed image by PST
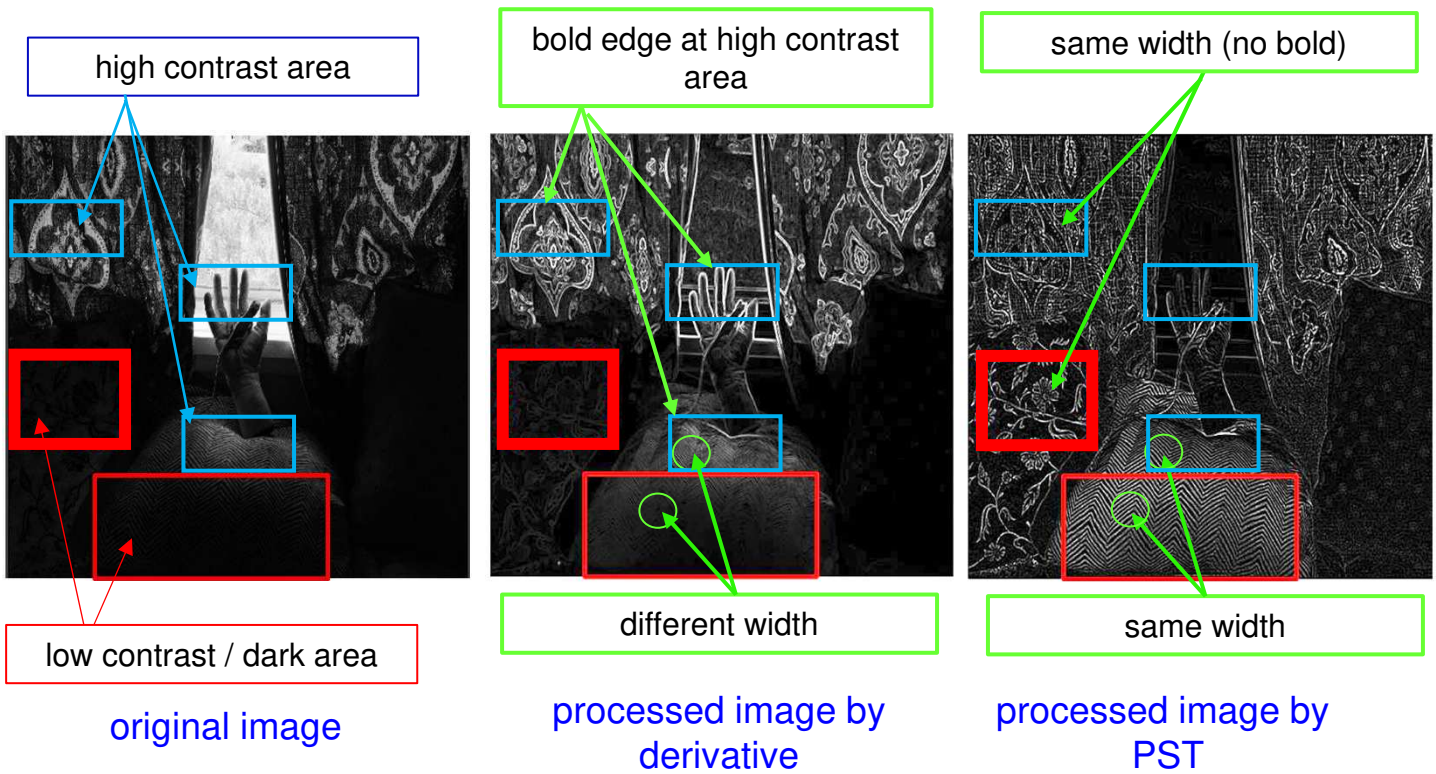
Feature of PST

1. textures and features are detected similarly without any influence of brightness

➡ PST helps to detect stable image characteristics to improve precision of image based AI

2. specimens are easily detected however illumination is insufficient

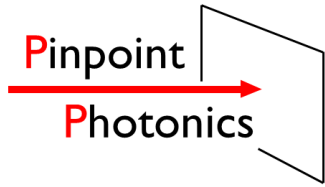➡ PST realizes long time observation of photo toxic specimens (cells)

As a collaboration work with Prof. Jalali, Pinpoint Photonics, Inc. is searching business application of PST

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Feasibility test 1 : stable texture detection against different illumination level

Background: As a texture value which is used in image based AI analysis and machine learning is based on pixel intensities, the value changes with illumination level. And a morphology value which is also used in AI analysis may change with boundary width.

Test result: We prepared intentionally made 6 images with different illumination. However the texture values are varied with different illumination level without PST, the texture values are stabled with PST
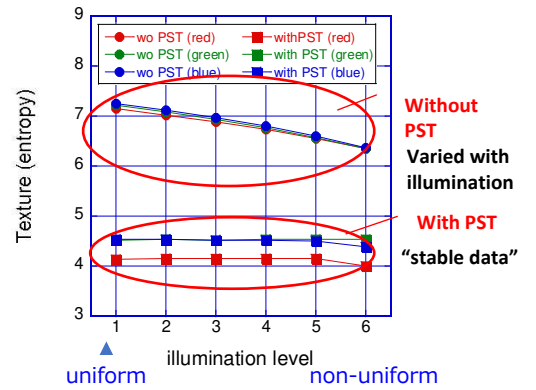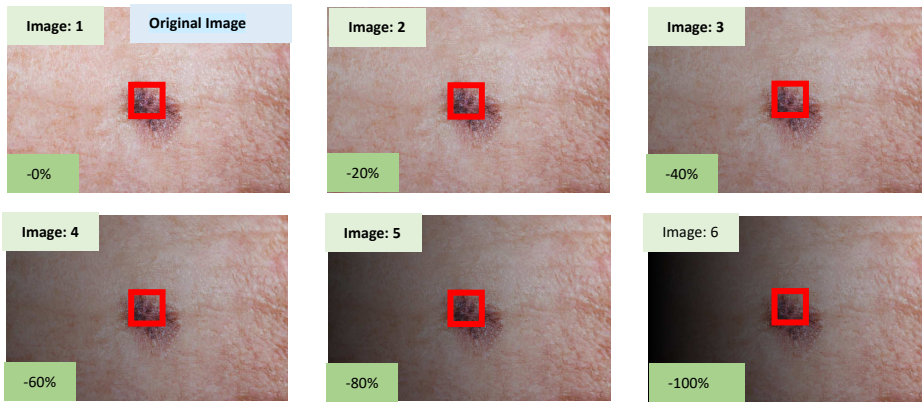

Melanoma images with different illumination for evaluation test

Effectiveness of PST

## Feasibility test 2: cell daughter analysis from dark images with 1/4 brightness

Background: It is hard to make cell daughter analysis with photo toxic cells because cells have damages from illumination.

Test results: By applying PST on time lapse images whose brightness level is darkened to 1/4 level, cell daughter analysis of B cells is successively made. Collaborator: Prof. Alexander Hoffmann, Signaling Systems Laboratory, UCLA
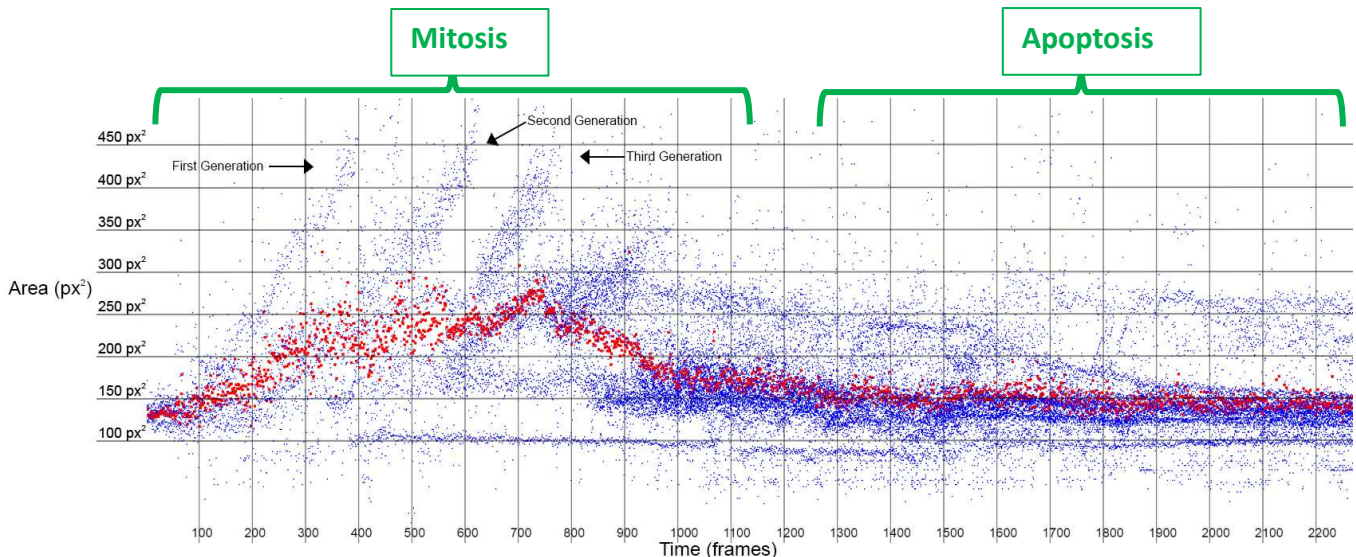
Cell daughter analysis of B cells

Image analysis / edge detection software
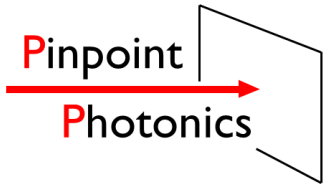
Dispersive PST
PST edge detection

Evaluation Software (windows application, 64bit)

Phase Stretch Transform (PST) edge detection software — Ver 1.0

Setting window of Pre-filter parameter

no median / selected median 1

Setting window of PST parameters

Delta F	1
Strength	0.9
Warp	12.14
TRSH min	−1
TRSH max	1

Process each selected image — select 1 image

Process all image file in the selected folder — select folder

Pinpoint Photonics, Inc.

2021/06/03

Application Window

Original image

Pocket shape, folding are successfully detected

After PST

Folding with high contrast is also detected

Edge detection result of "cameraman.jpg" by PST

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