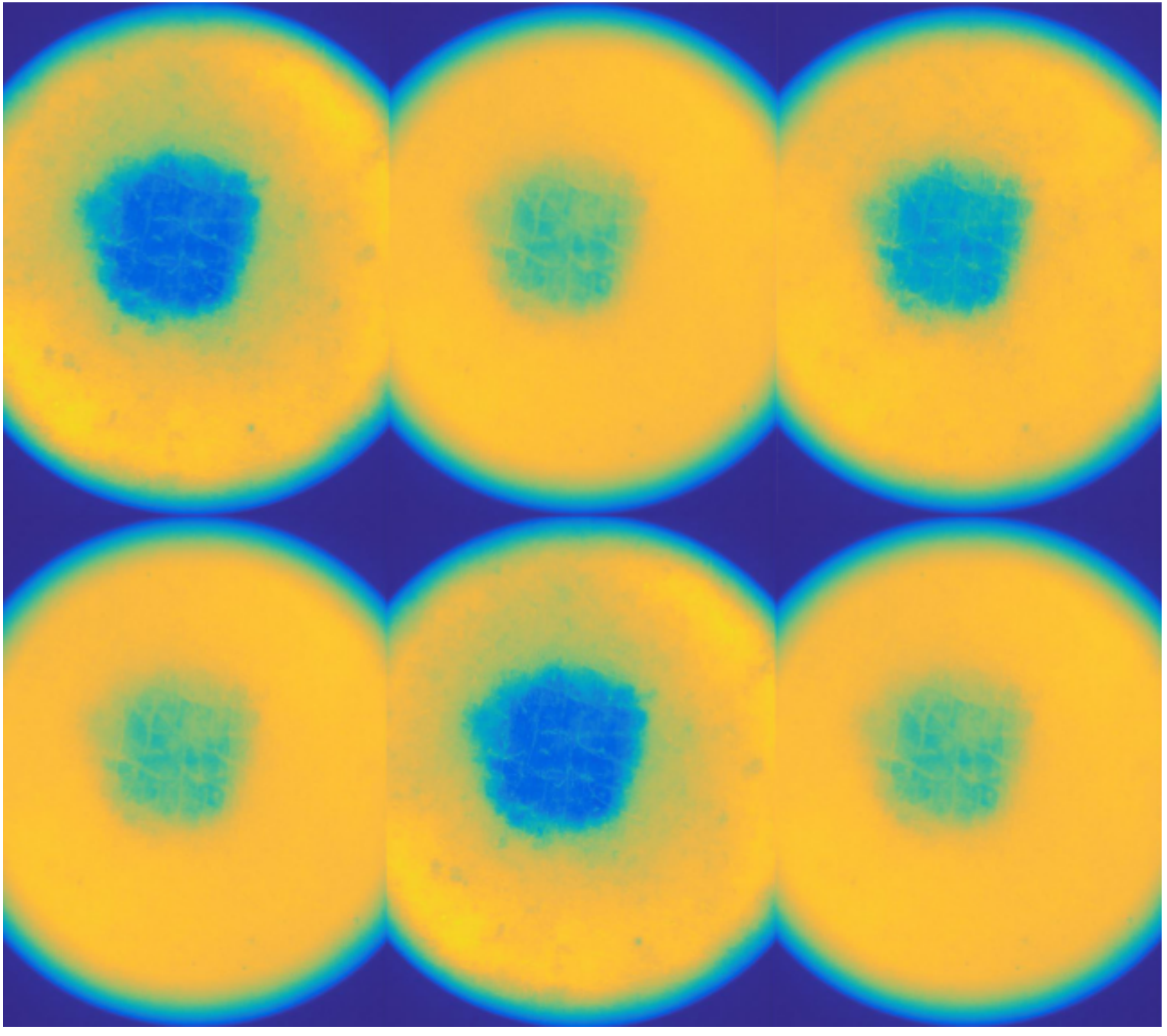


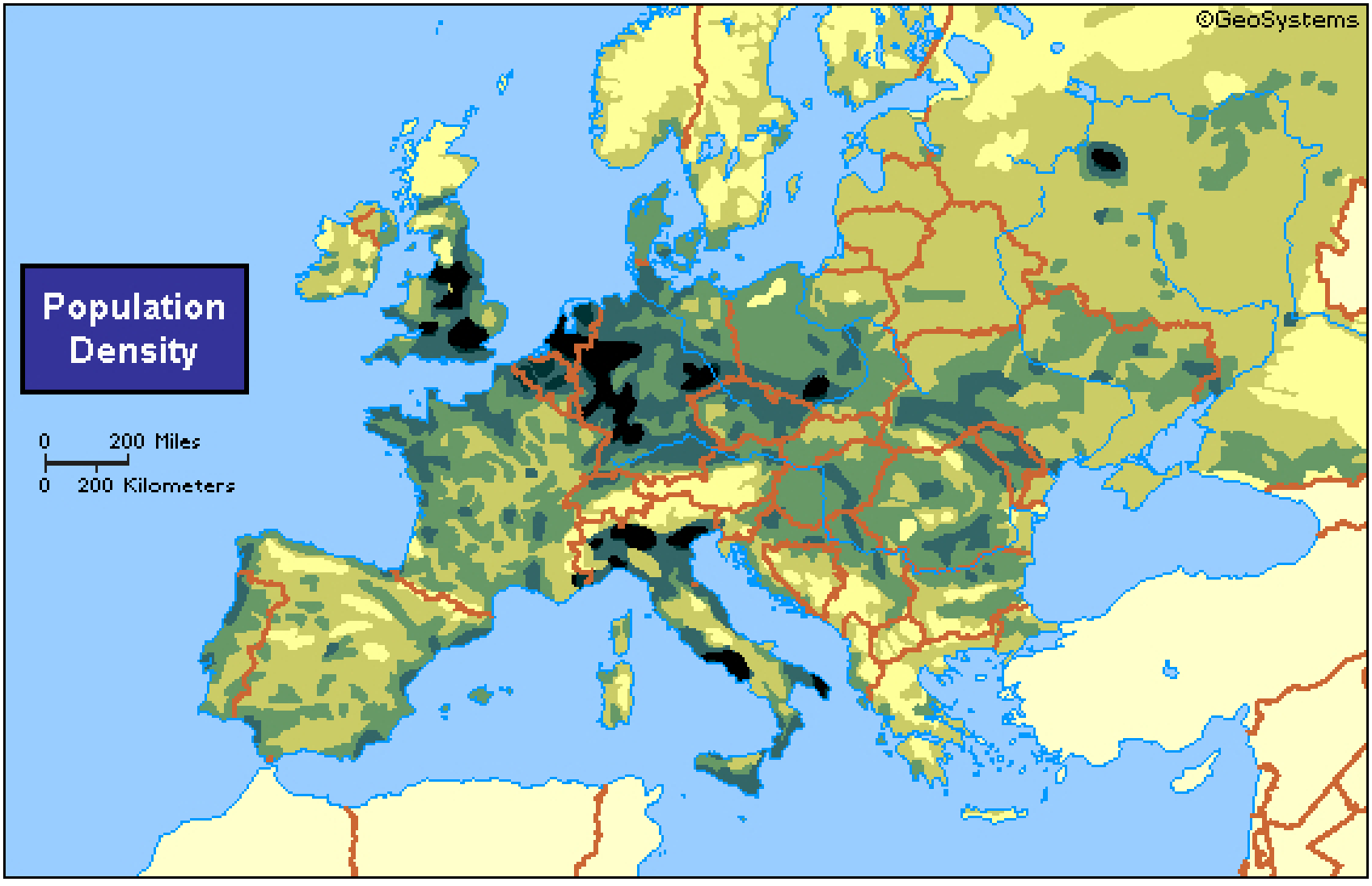
Melanoma detection by automatic image analysis

a pop-science presentation

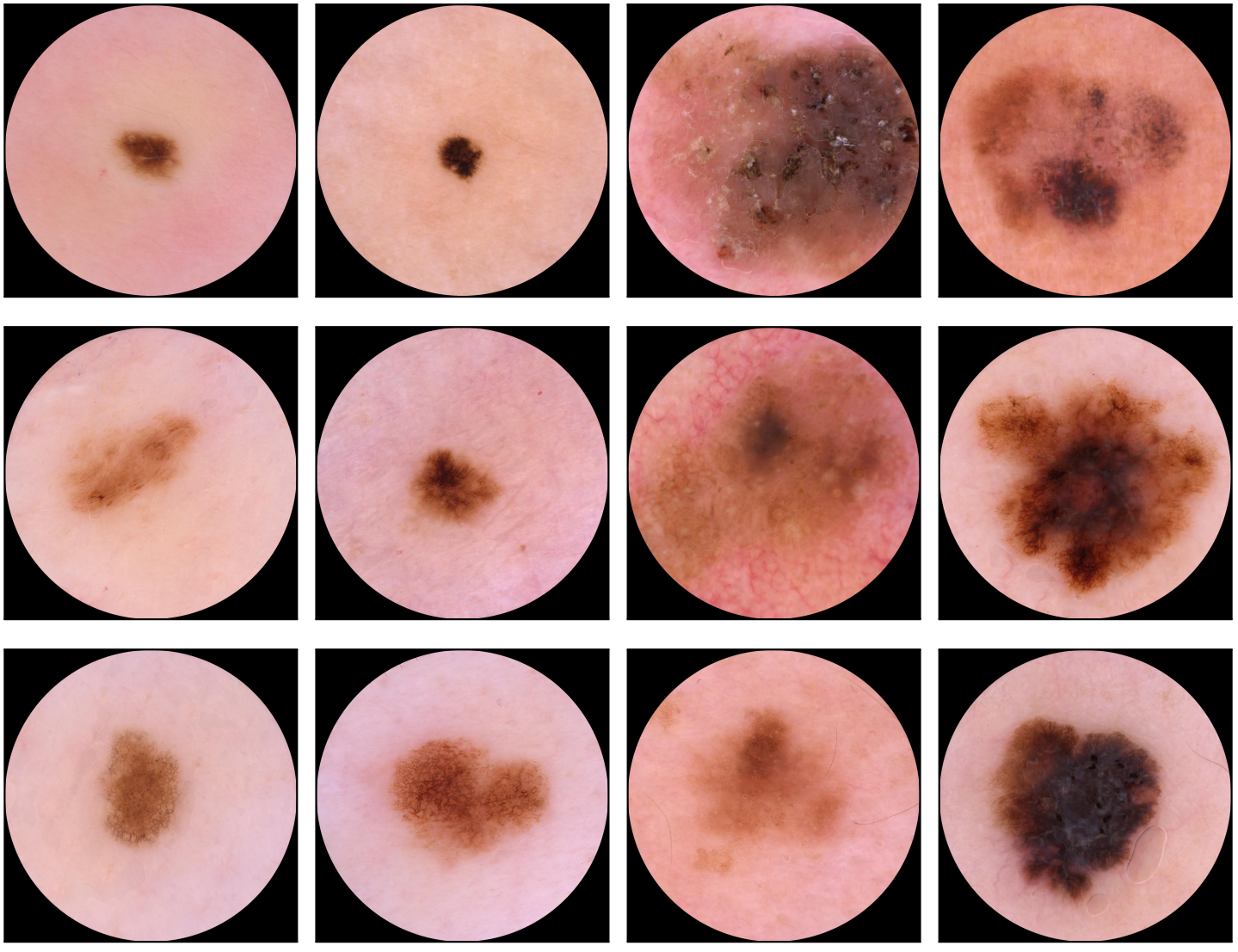
Kajsa Møllersen

August 24th 2016

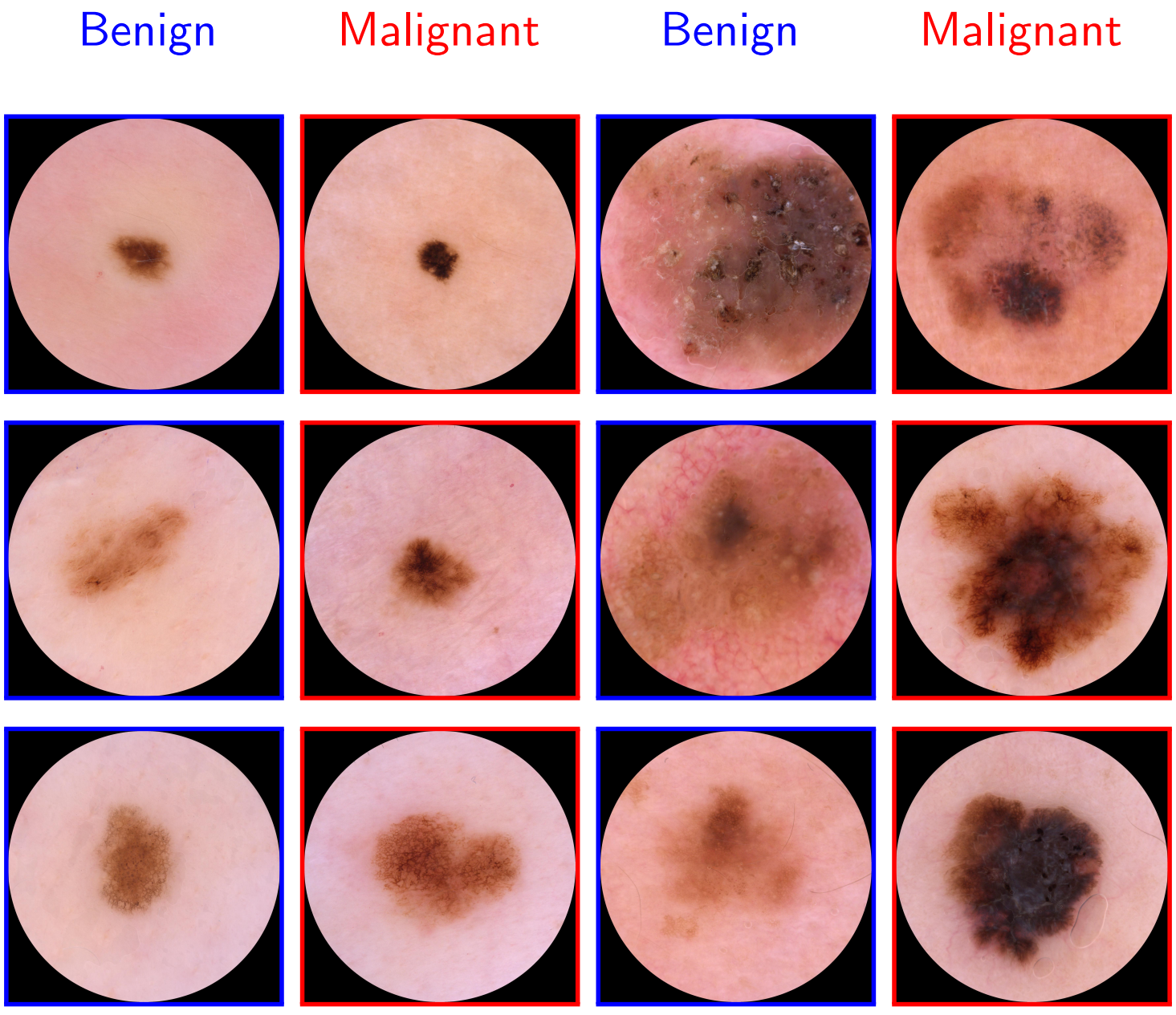

BANANA BOAT
SPORT
50
OMBRA
ULTRA SPORT
50
*Based on prices from six stores in each of two major supermarket chains in VIC, NSW and QLD on 11/03/15
Always read the label. Use only as directed.


©GeoSystems
Population Density
0 200 Miles
0 200 Kilometers

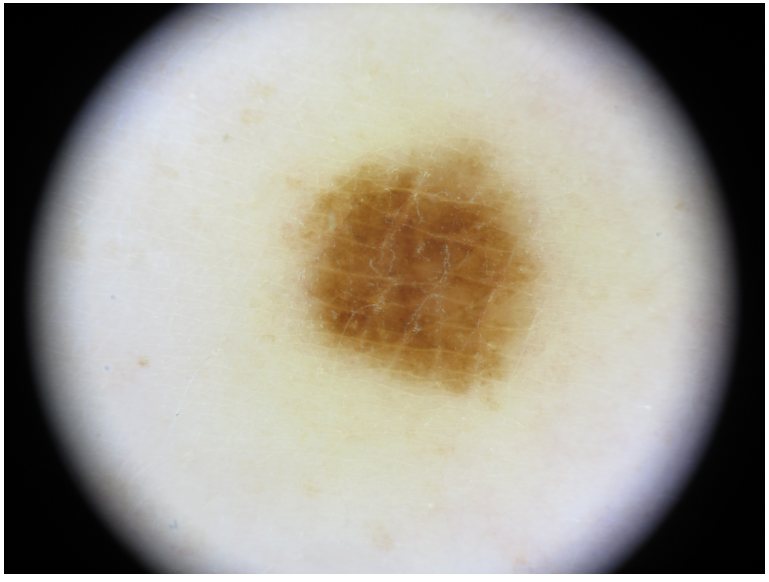
Dermoscopic images of skin lesions



Diagnosis confirmed by histopathology

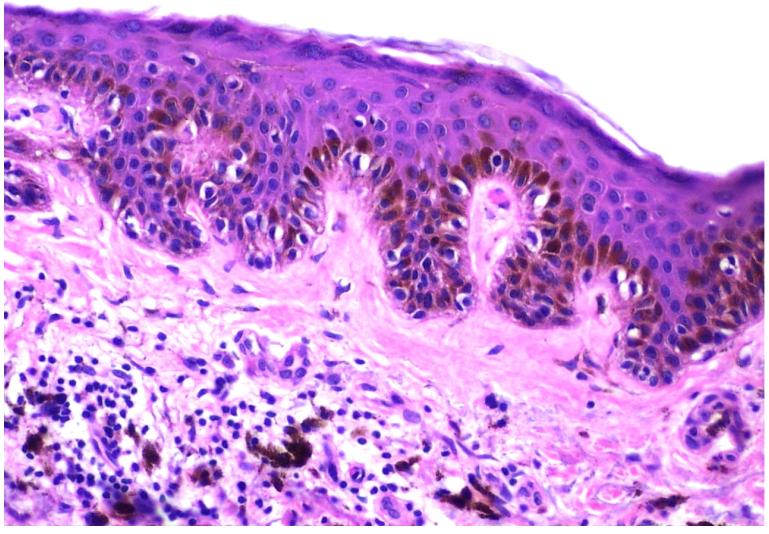


Decision support

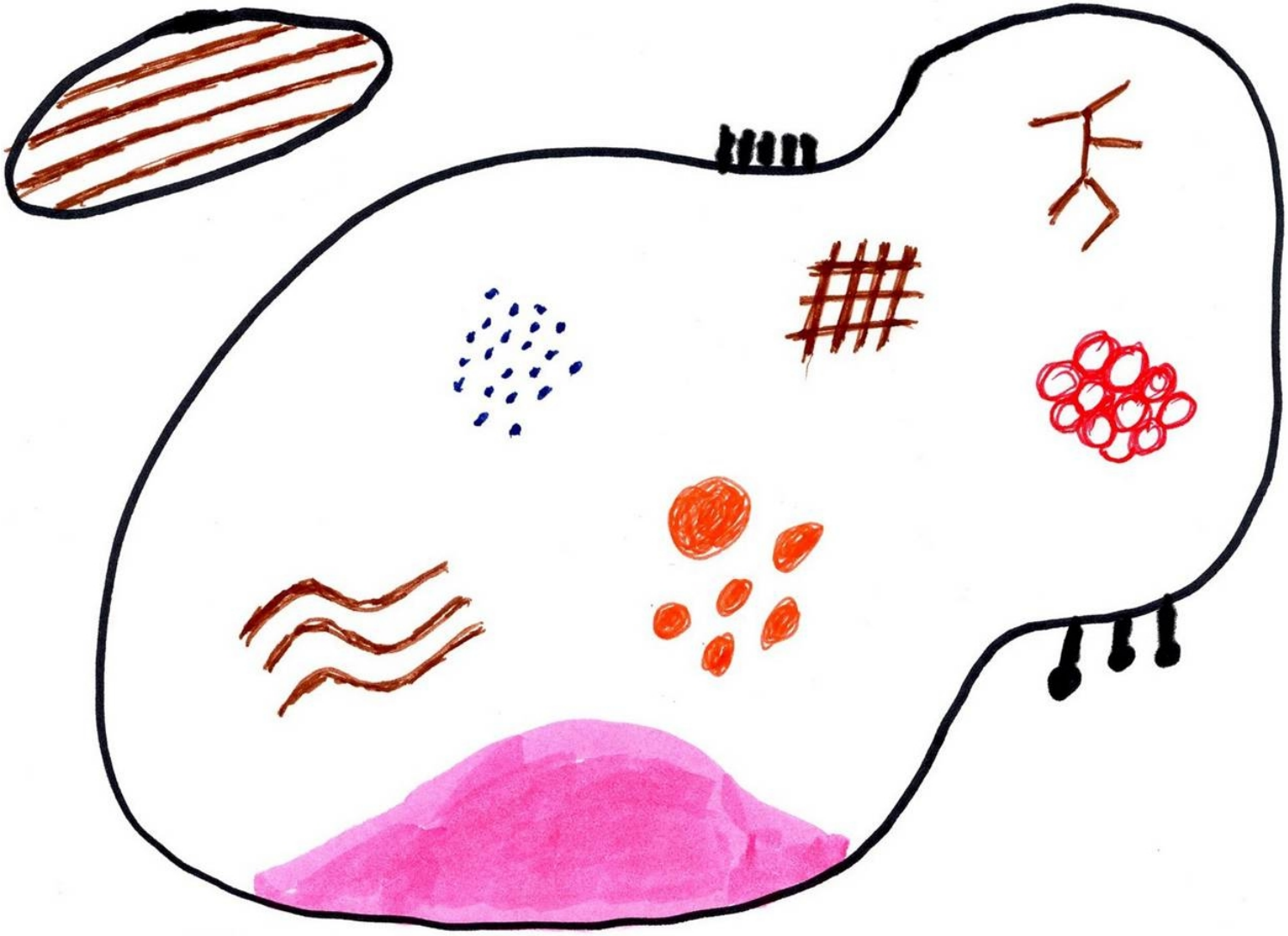


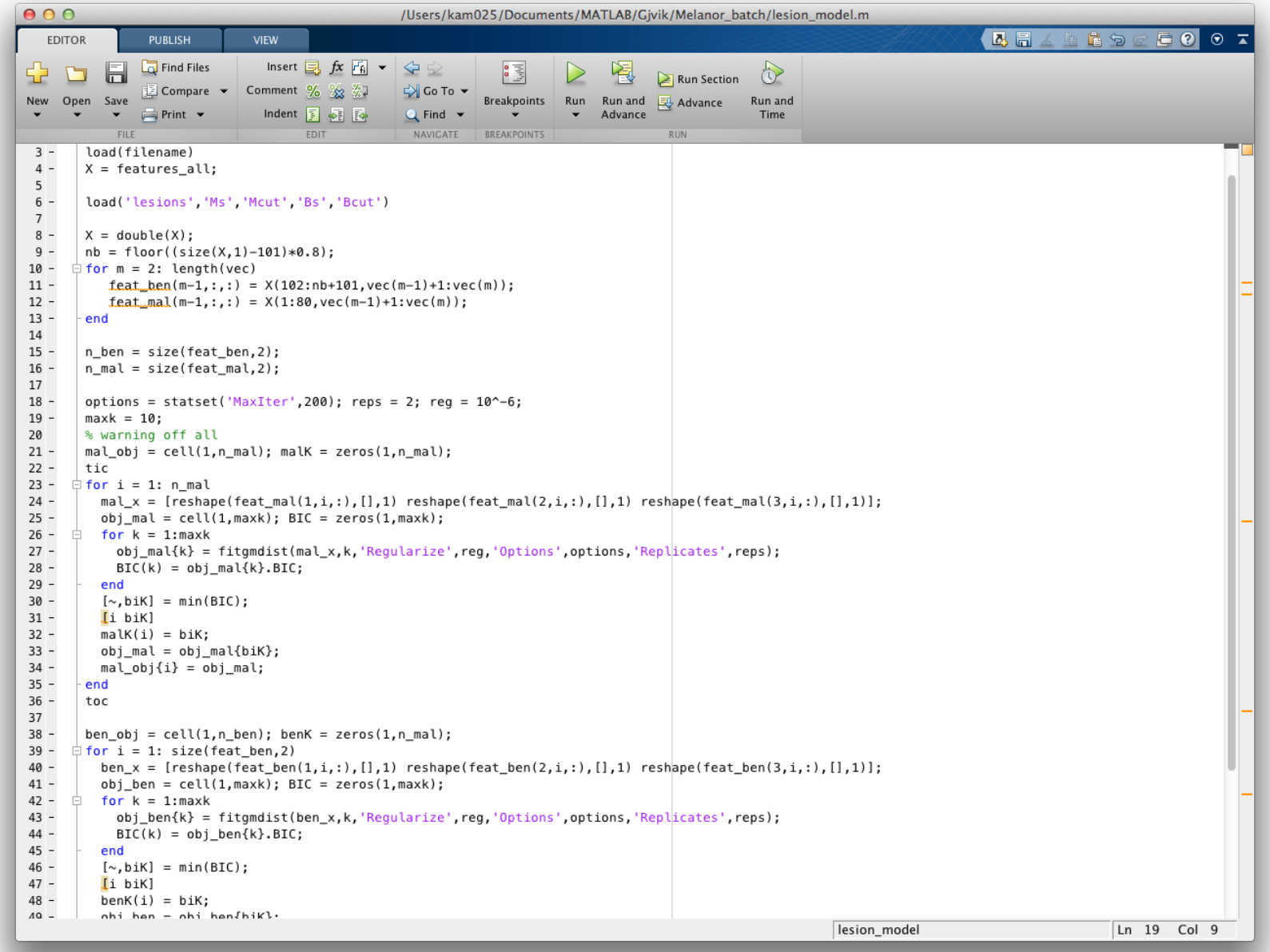
Cut vs. not-cut

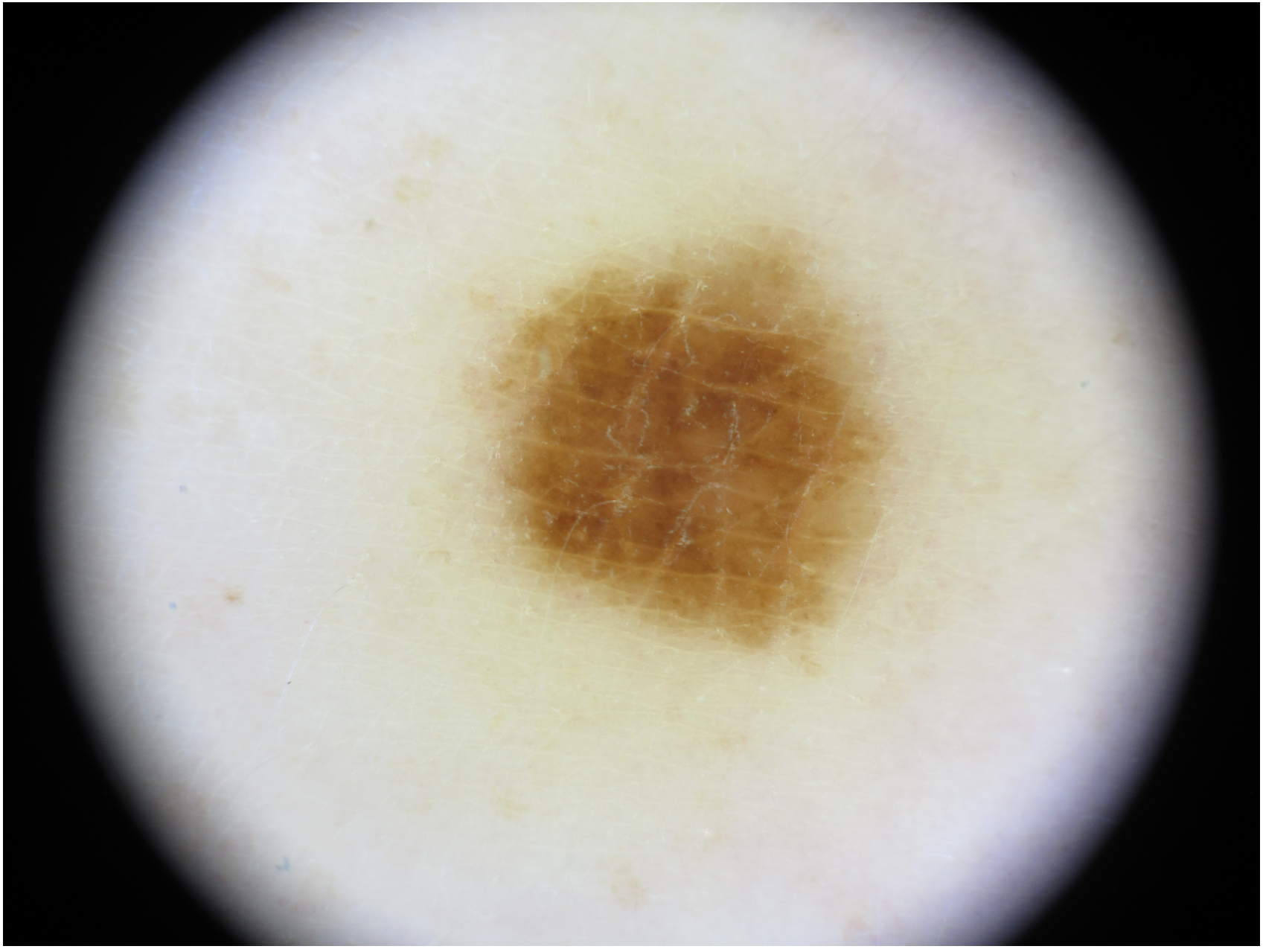
Diagnosis



Melanoma vs. other lesion




/Users/kam025/Documents/MATLAB/Gjvik/Melanor_batch/lesion_model.m
EDITOR
PUBLISH
VIEW
New
Open
Save
Find Files
Compare
Print
FILE
Insert
Comment
Indent
EDIT
Go To
Find
NAVIGATE
Breakpoints
BREAKPOINTS
Run
Run and Advance
Run Section
Advance
Run and Time
RUN
load(filename)
X = features_all;
load('lesions','Ms','Mcut','Bs','Bcut')
X = double(X);
nb = floor((size(X,1)-101)*0.8);
for m = 2: length(vec)
feat_ben(m-1,:,:) = X(102:nb+101,vec(m-1)+1:vec(m));
feat_mal(m-1,:,:) = X(1:80,vec(m-1)+1:vec(m));
end
n_ben = size(feat_ben,2);
n_mal = size(feat_mal,2);
options = statset('MaxIter',200); reps = 2; reg = 10^-6;
maxk = 10;
% warning off all
mal_obj = cell(1,n_mal); malK = zeros(1,n_mal);
tic
for i = 1: n_mal
mal_x = [reshape(feat_mal(1,i,:),[],1) reshape(feat_mal(2,i,:),[],1) reshape(feat_mal(3,i,:),[],1)];
obj_mal = cell(1,maxk); BIC = zeros(1,maxk);
for k = 1:maxk
obj_mal{k} = fitgmdist(mal_x,k,'Regularize',reg,'Options',options,'Replicates',reps);
BIC(k) = obj_mal{k}.BIC;
end
[~,biK] = min(BIC);
[i biK]
malK(i) = biK;
obj_mal = obj_mal{biK};
mal_obj{i} = obj_mal;
end
toc
ben_obj = cell(1,n_ben); benK = zeros(1,n_mal);
for i = 1: size(feat_ben,2)
ben_x = [reshape(feat_ben(1,i,:),[],1) reshape(feat_ben(2,i,:),[],1) reshape(feat_ben(3,i,:),[],1)];
obj_ben = cell(1,maxk); BIC = zeros(1,maxk);
for k = 1:maxk
obj_ben{k} = fitgmdist(ben_x,k,'Regularize',reg,'Options',options,'Replicates',reps);
BIC(k) = obj_ben{k}.BIC;
end
[~,biK] = min(BIC);
[i biK]
benK(i) = biK;
lesion_model
Ln 19 Col 9



2.722.500 pixels

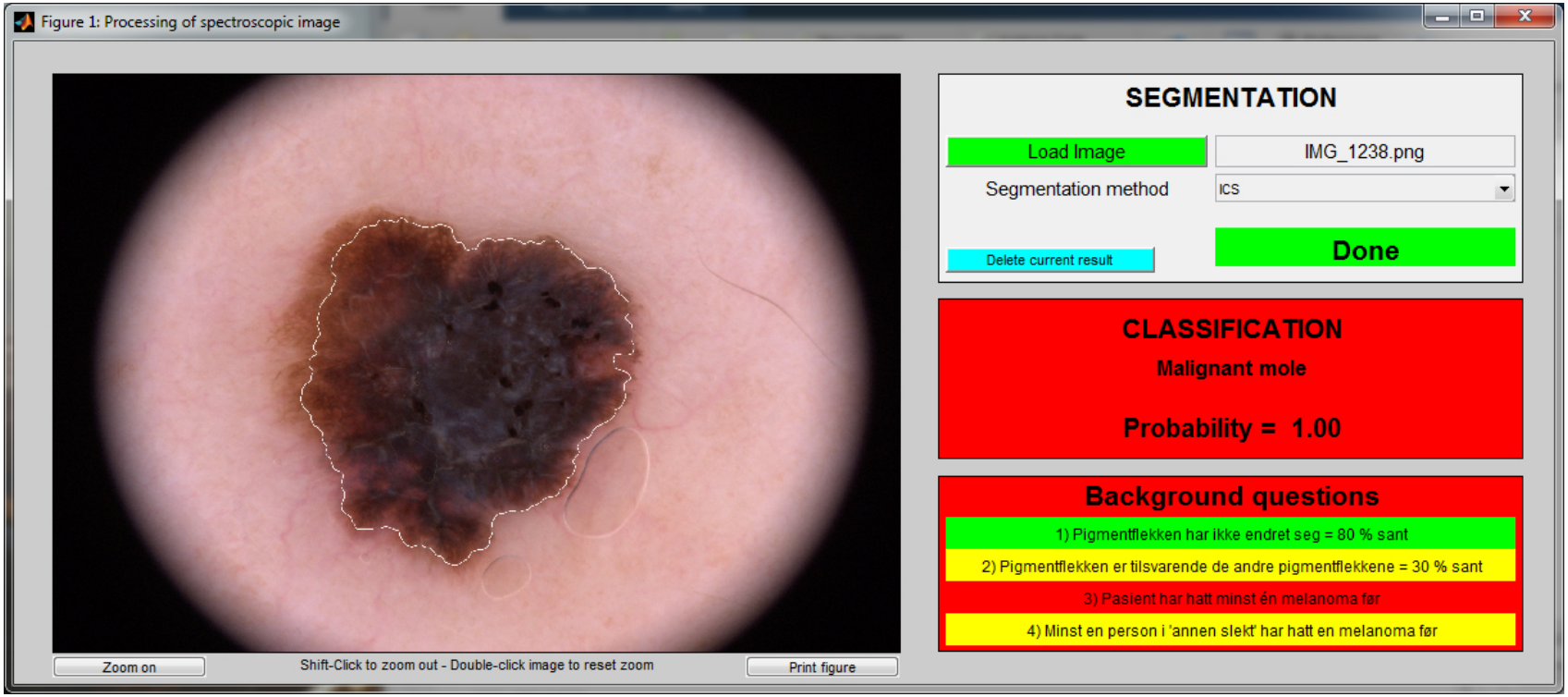


Figure 1: Processing of spectroscopic image
SEGMENTATION
Load Image
IMG_1238.png
Segmentation method
ICS
Delete current result
Done
CLASSIFICATION
Malignant mole
Probability = 1.00
Background questions
1) Pigmentflekken har ikke endret seg = 80 % sant
2) Pigmentflekken er tilsvarende de andre pigmentflekkene = 30 % sant
3) Pasient har hatt minst én melanoma før
4) Minst en person i 'annen slekt' har hatt en melanoma før
Zoom on
Shift-Click to zoom out - Double-click image to reset zoom
Print figure

Kirkenes Hafen. Lisensiert under CC BY 2.5 via Wikimedia Commons

Classification of uncertain objects

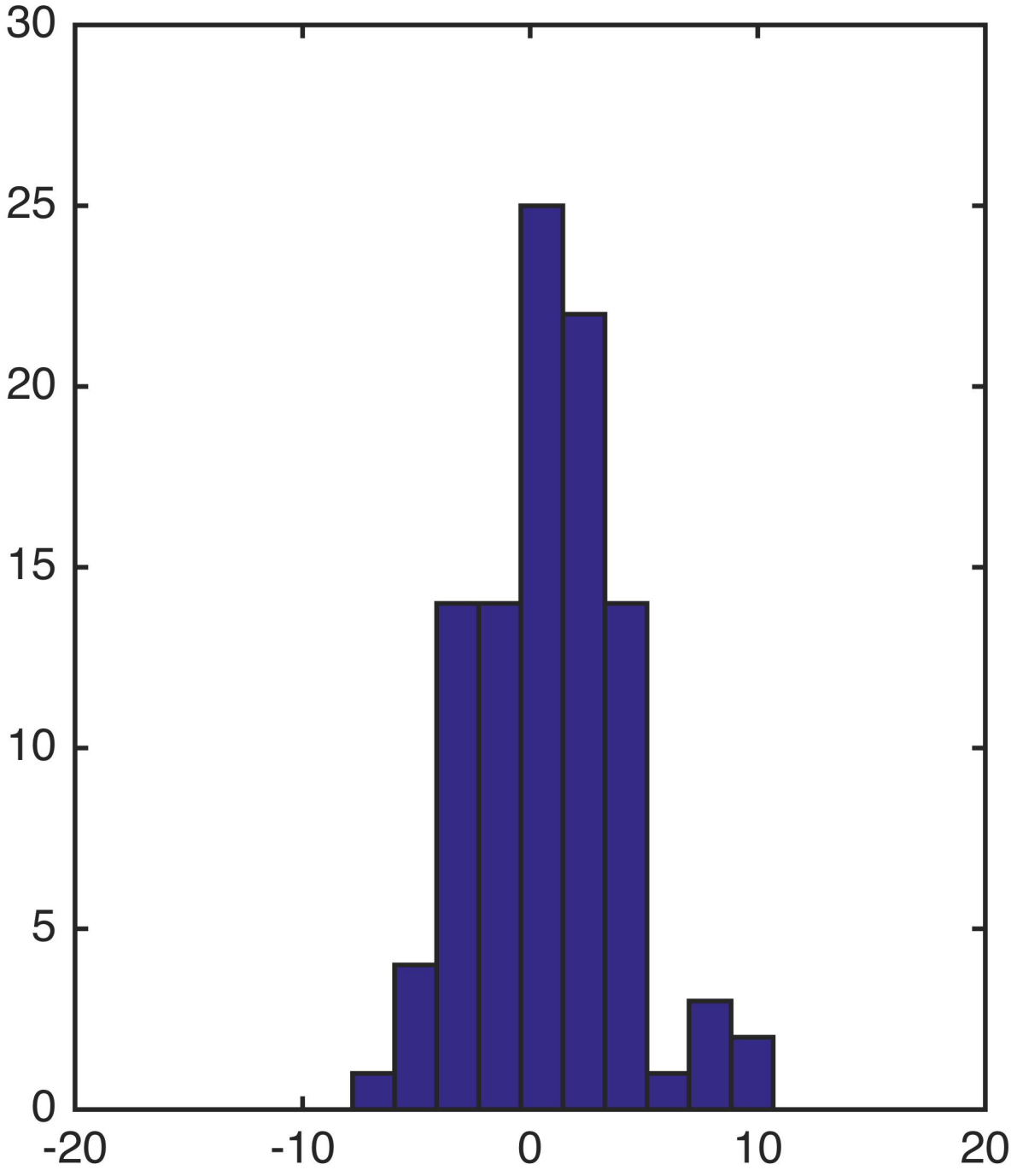
not a pop-science presentation

Kajsa Møllersen

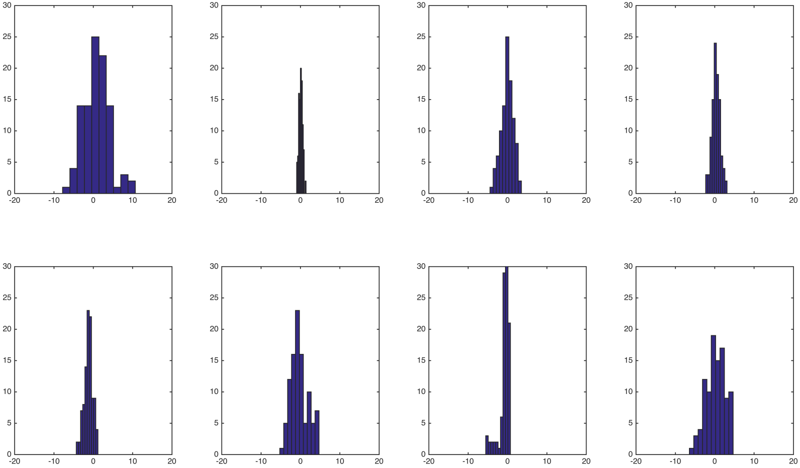
August 24th 2016

Space
Time
Noise

- Many measurements
- Ignore time and space

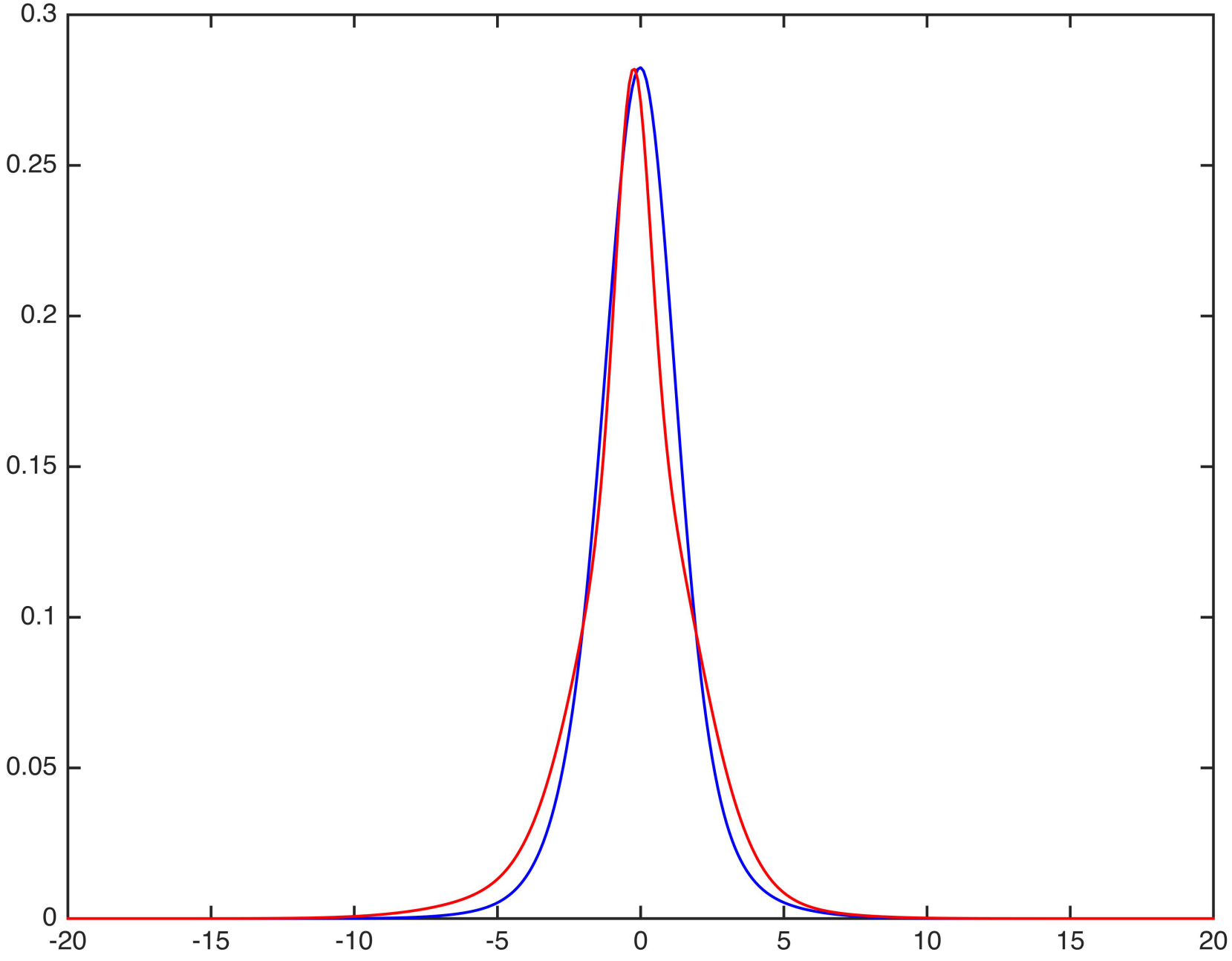

30
25
20
15
10
5
0
-20
-10
0
10
20

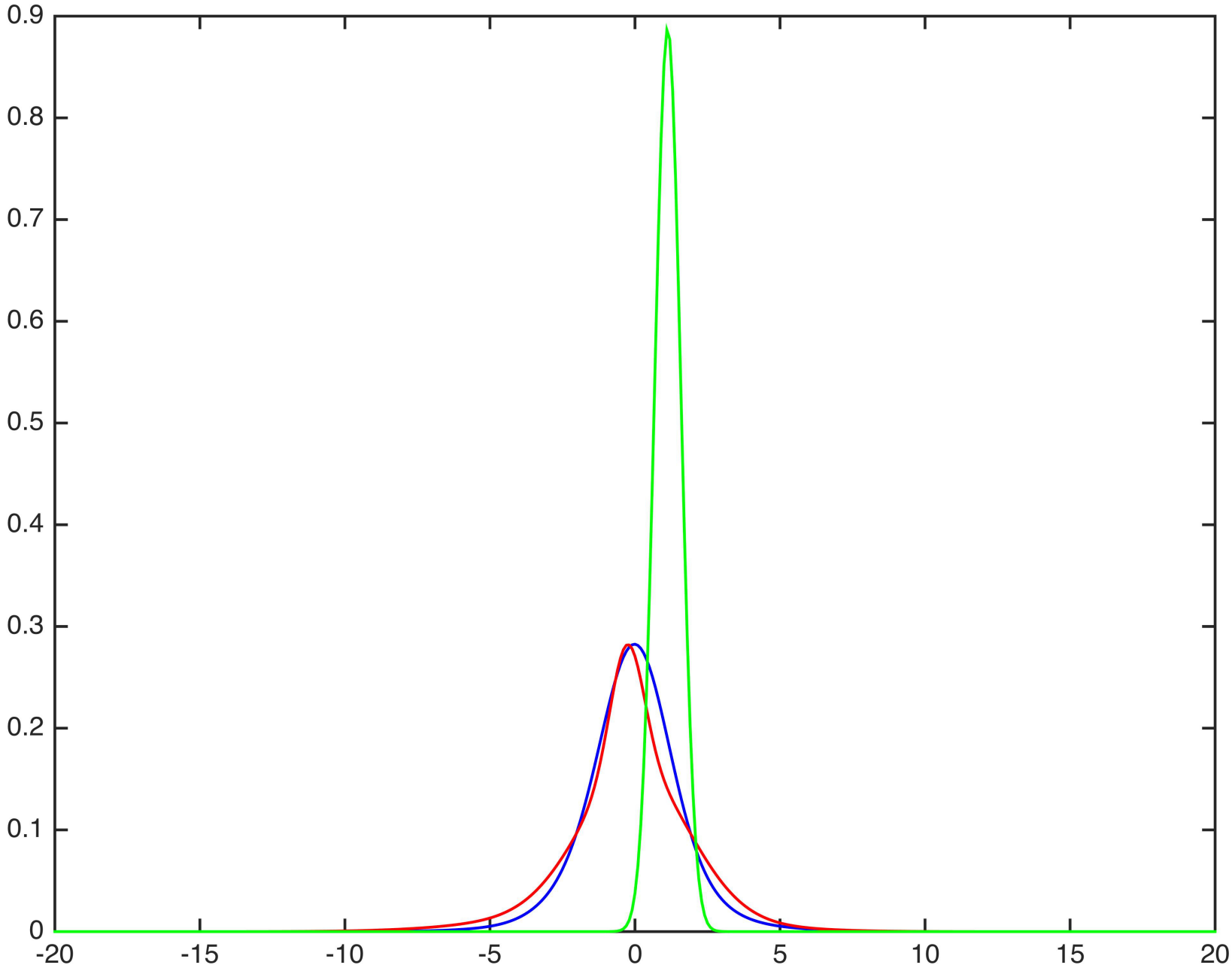
(1) Good management
(2) Poor management


30
25
20
15
10
5
0
-20
-10
0
10
20

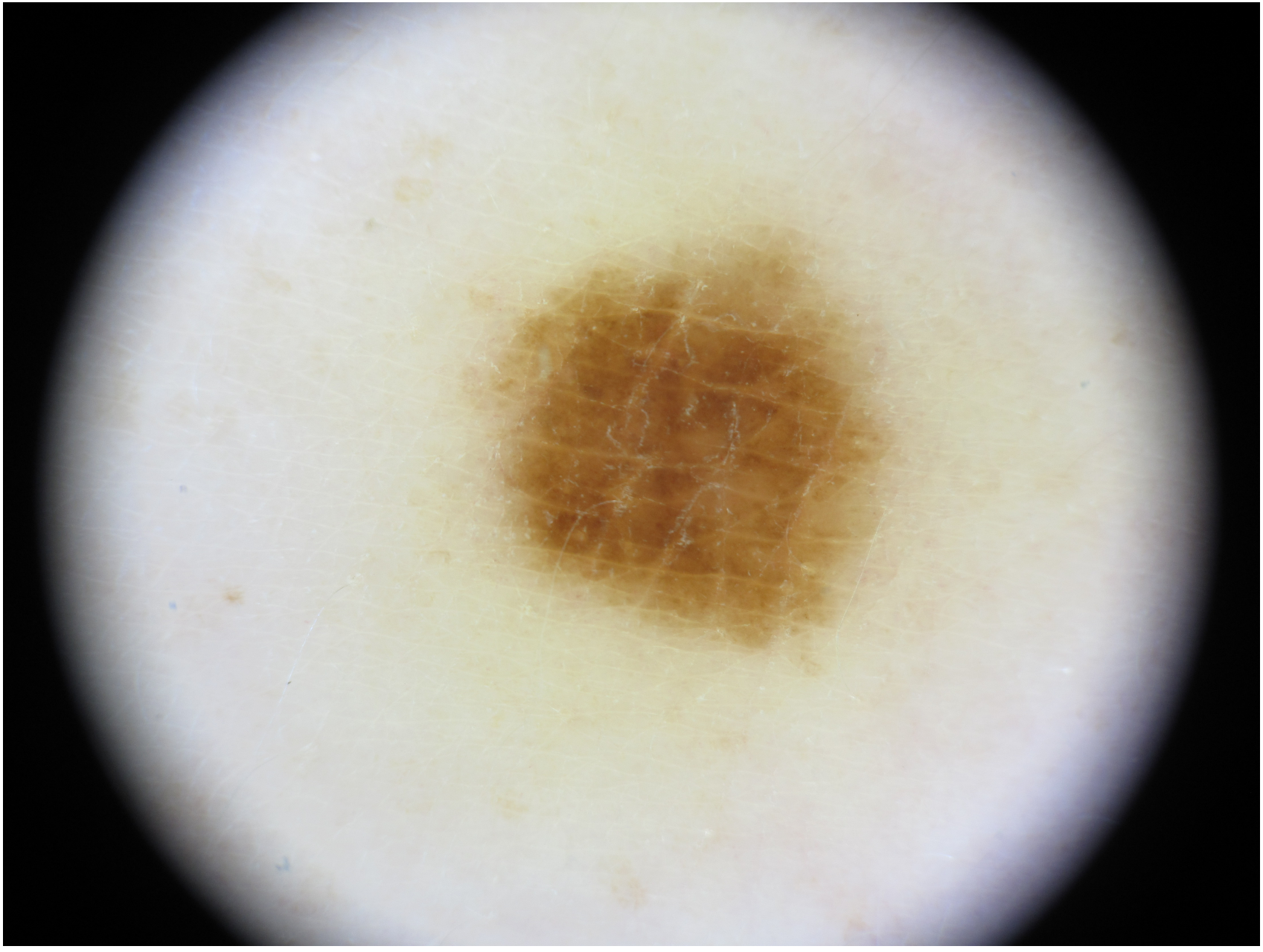
Model weighted divergence

Divergence = difference

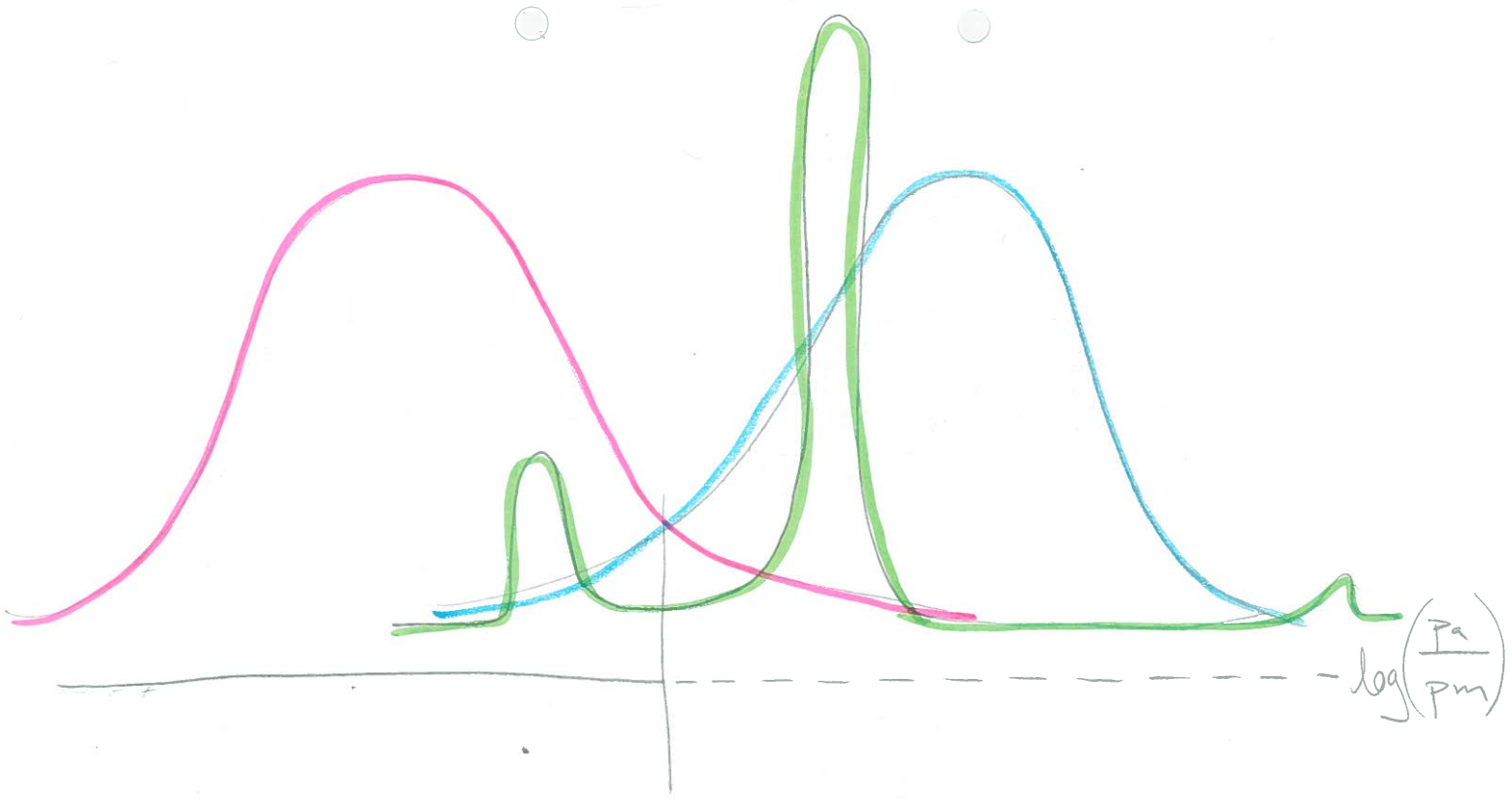

0.3
0.25
0.2
0.15
0.1
0.05
0
-20
-15
-10
-5
0
5
10
15
20


0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-20
-15
-10
-5
0
5
10
15
20

$$\mathtt{I}_a(s, m) = \int p_s(\mathbf{x}) p_a(\mathbf{x}) \log \frac{p_a(\mathbf{x})}{p_m(\mathbf{x})} \, \mathrm{d}\mathbf{x}$$



2.722.500 pixels


$\log\left(\frac{P_a}{P_m}\right)$