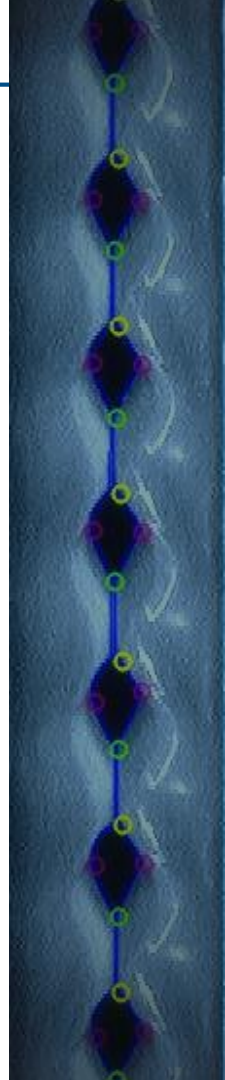




Zpracování obrazových dat u nových medicínských technik snímání lidského těla

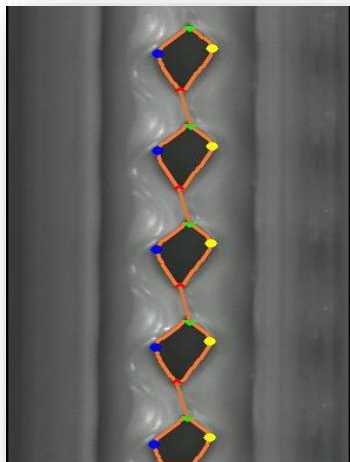
Barbara Zitová, Adam Novozámský
zitova @ utia.cas.cz

ÚTIA Ústav teorie informace a automatizace
Akademie věd ČR

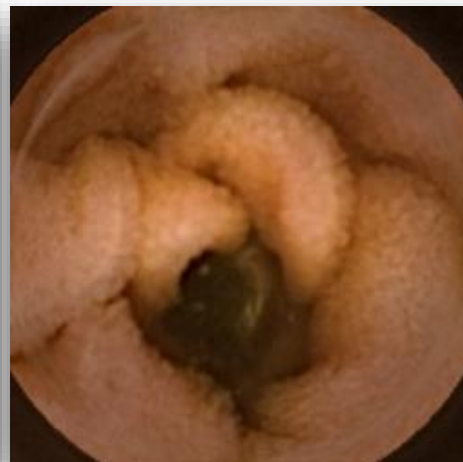




Videokymografie



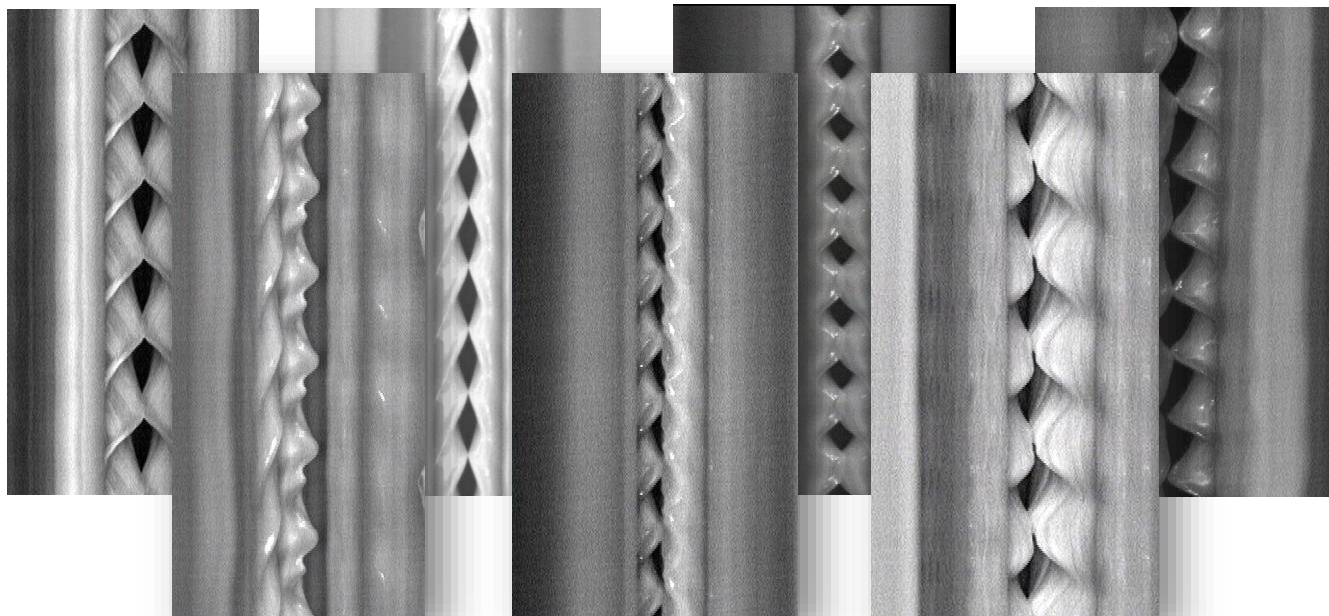
Endoskopie





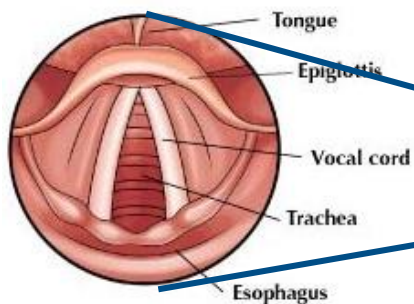
Videokymografie

UPOL, Medico

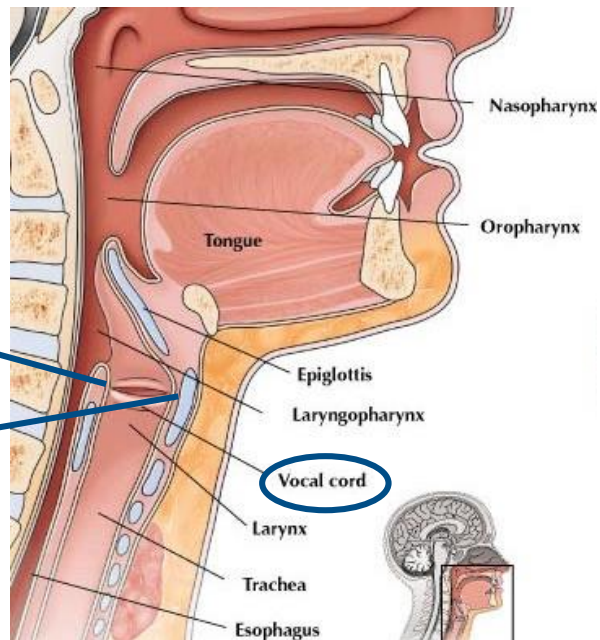


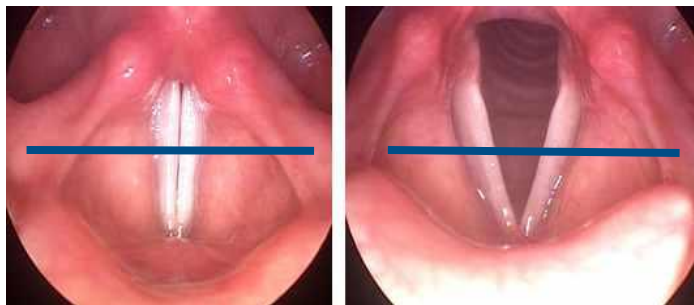


Videokymografie



LARYNGOSCOPIC VIEW

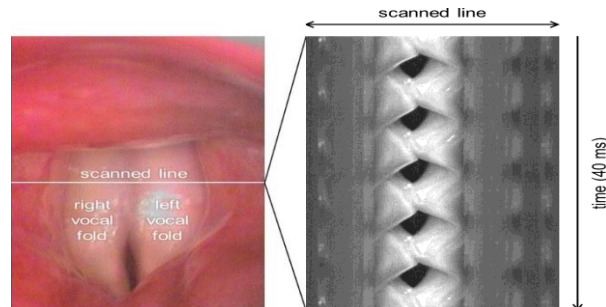






Videokymografie

- analýza hlasivek
- rychlost 7200 In/s
- původní ČR/NL metoda (1994)
- alternativa k high-speed nahrávkám



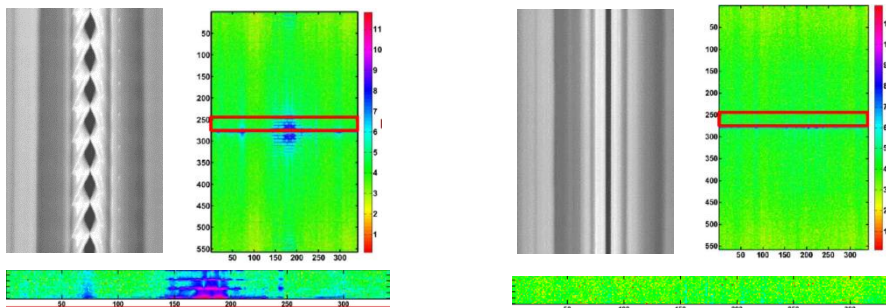
charakteristiky kmitání hlasivek



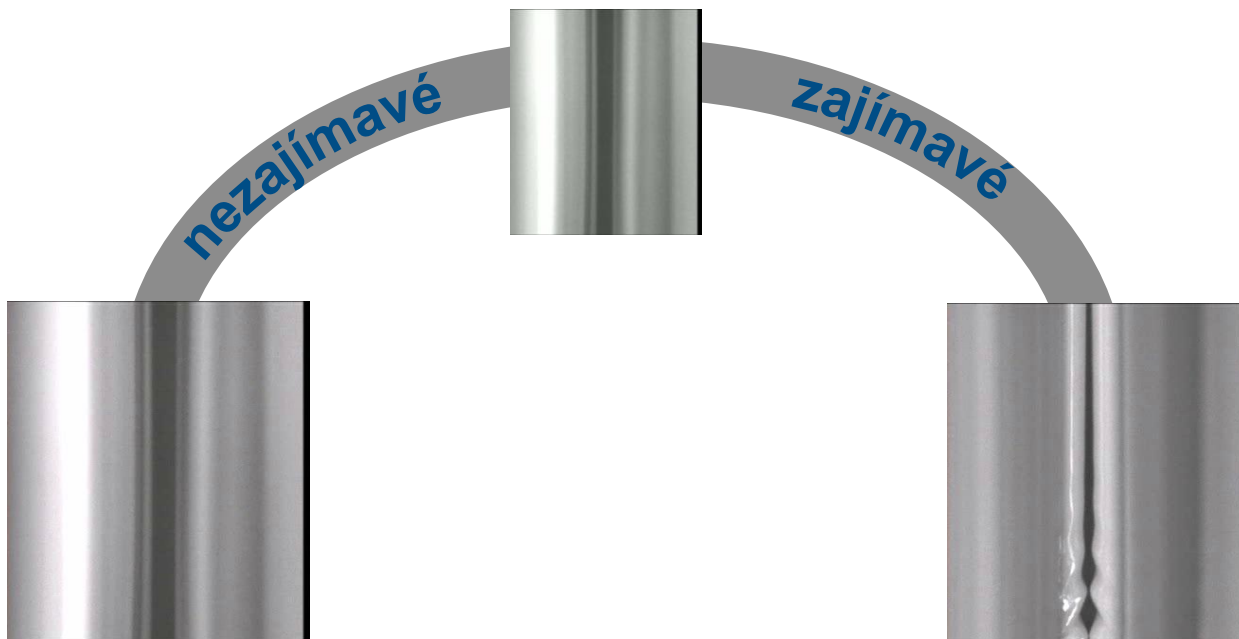
Předzpracování

- automatická úprava jasu a kontrastu
- odstranění šumu
- odstranění odlesků

Volba „zajímavých“ dat

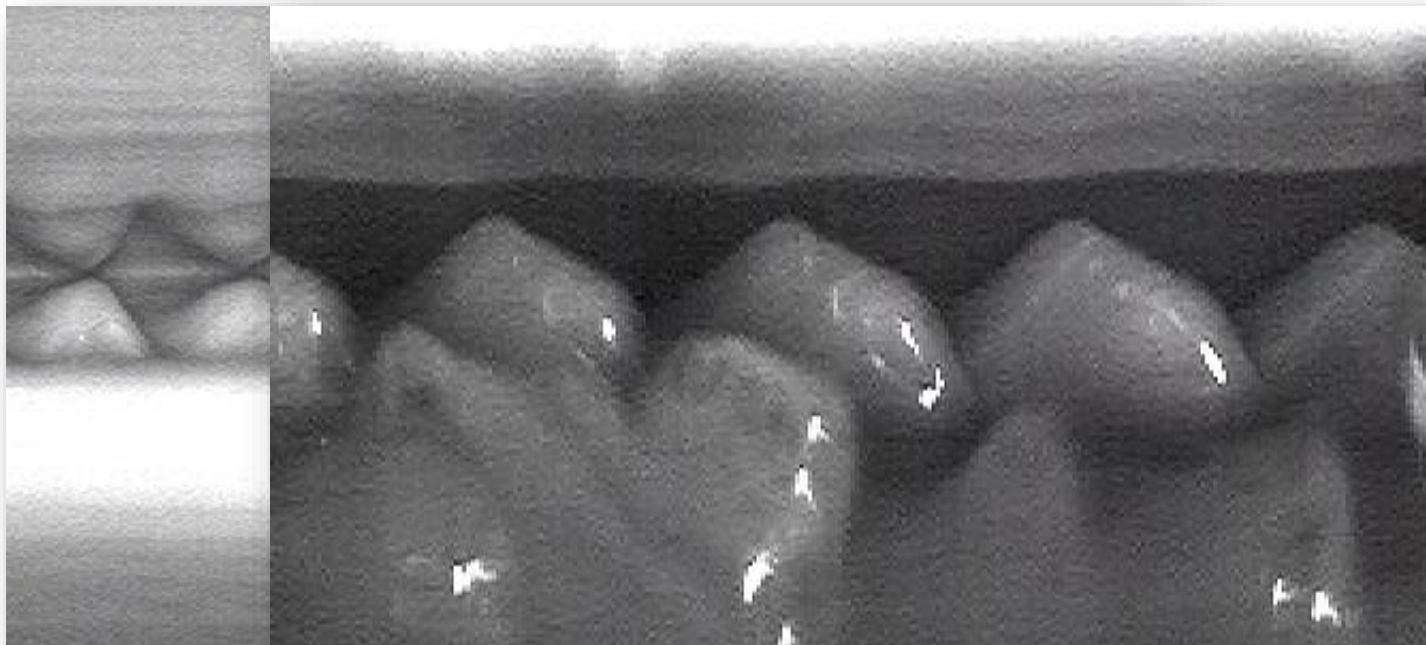


sloupcová FFT

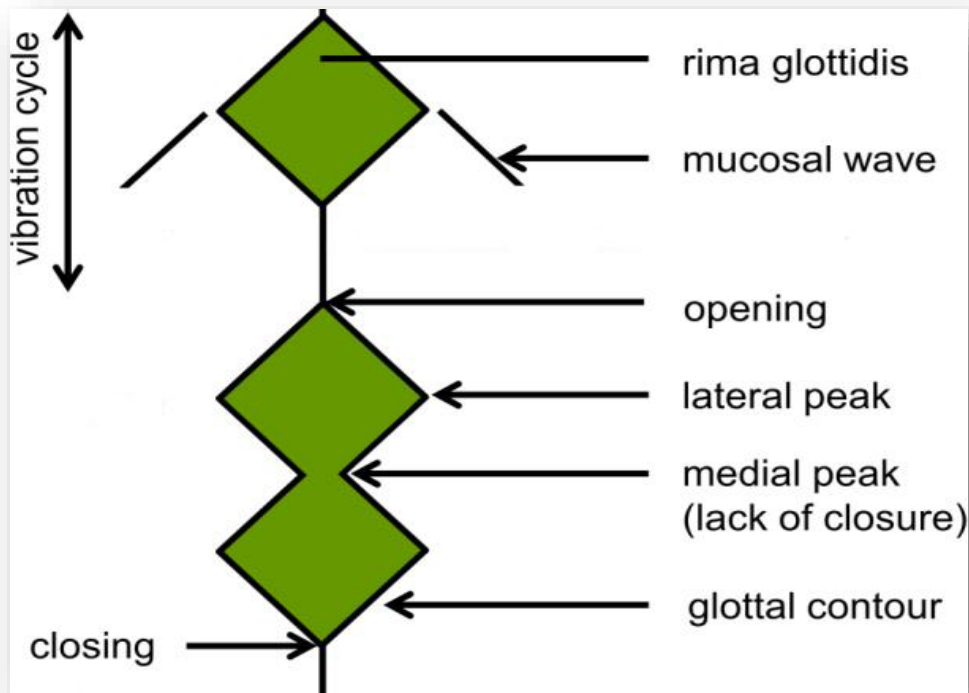


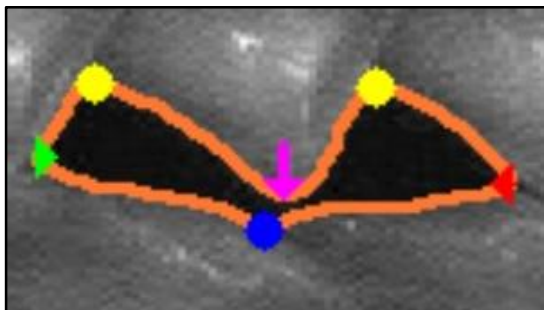


VKG segmentace – prahování kombinace s normalized graph cuts



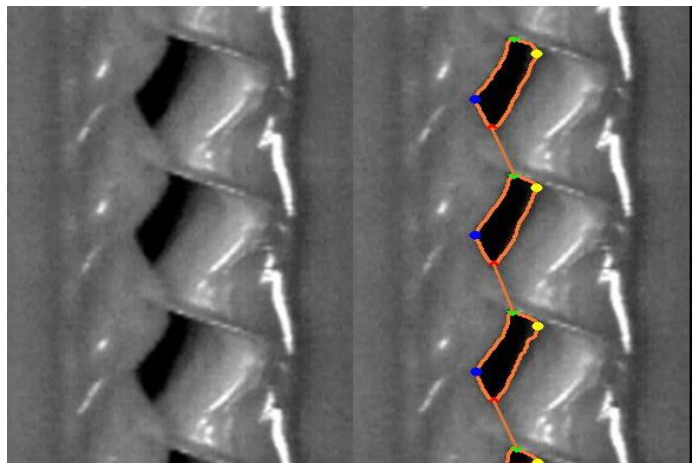
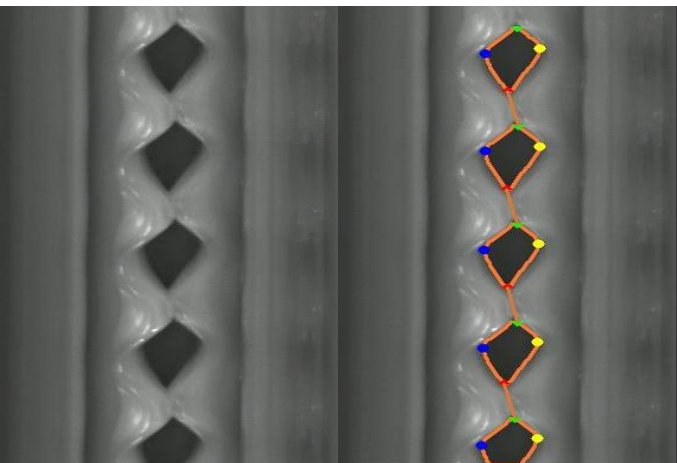
Extrakce příznaků





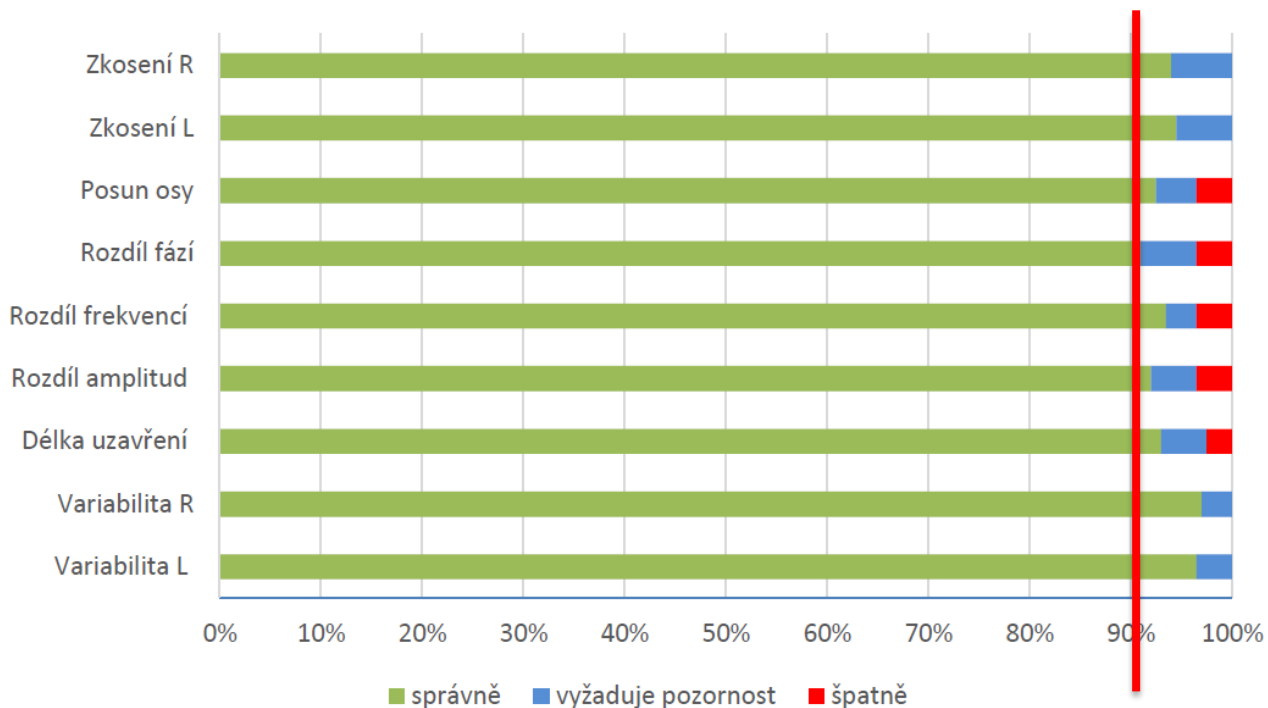
opening points	O_i
closing points	C_i
lateral peaks	A_i^R, A_i^L
medial peaks	M_i^R, M_i^L

feature	notation and definition
generalized opening points	$\tilde{O}_i^j = \{O_i, M_i^j\}$
generalized closing points	$\tilde{C}_i^j = \{C_i, M_i^j\}$
opening phase duration	$t_i^{oj} = A_i^j(y) - \tilde{O}_i^j(y)$
closing phase duration	$t_i^{cj} = \tilde{C}_i^j(y) - A_i^j(y)$
open phase duration	$T_i^{oj} = t_i^{oj} + t_i^{cj} = \tilde{C}_i^j(y) - \tilde{O}_i^j(y)$
closed phase duration	$T_i^{cj} = \tilde{O}_{i+1}^j(y) - \tilde{C}_i^j(y)$
vibration cycle duration	$T_i^j = T_i^{oj} + T_i^{cj} = t_i^{oj} + t_i^{cj} + T_i^{cj} = \tilde{O}_{i+1}^j(y) - \tilde{O}_i^j(y)$
vocal fold amplitudes	$a_i^j = \max(A_i^j(x) - \tilde{O}_i^j(x) , A_i^j(x) - \tilde{C}_i^j(x))$
glottal amplitudes	$a_i = A_i^L(x) - A_i^R(x)$



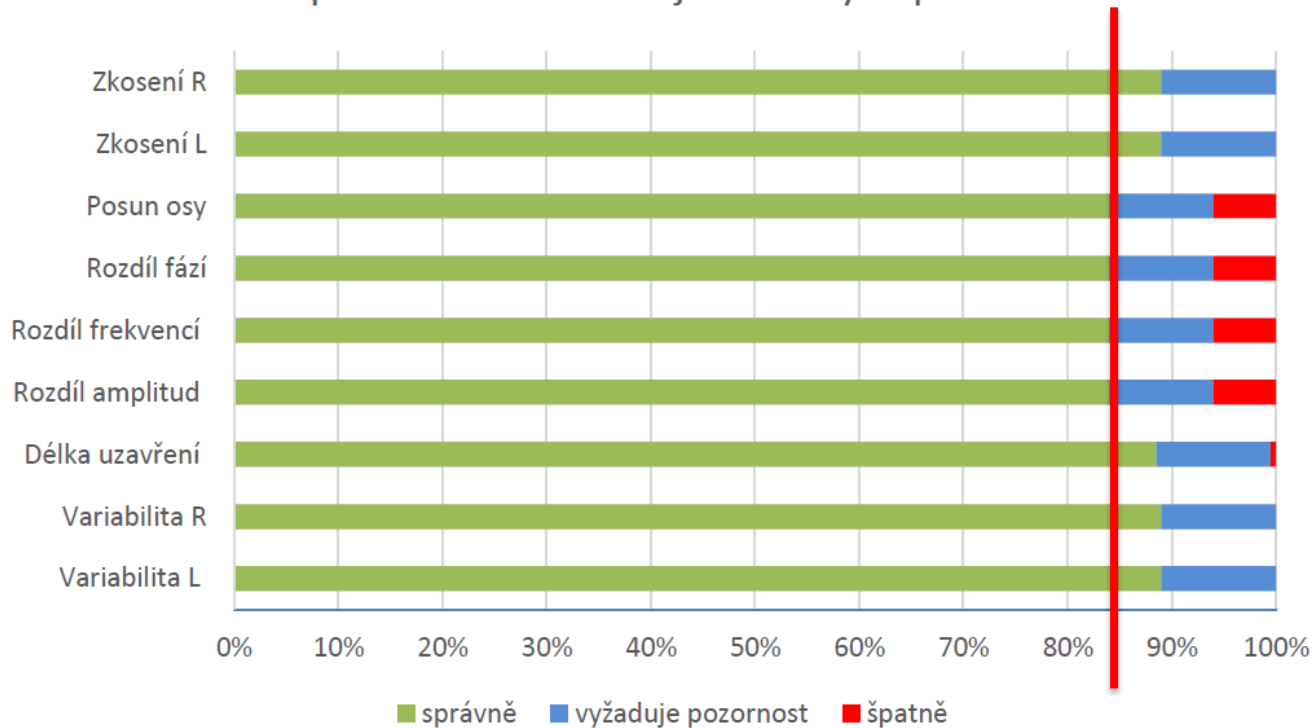


Úspěšnost hodnocení jednotlivých příznaků





Úspěšnost hodnocení jednotlivých příznaků





VGAnalyzer

Parameter	Value	Cat.	Description
Num. of Cycles L:	13.53	14	
Num. of Cycles R:	13.53	14	
Variability L:	1.00	1	negligible
Variability R:	1.00	1	negligible
Closure Durations:	0.35	3	20-40%
Amplitude Diff.:	-0.11	3	R slightly larger
Frequency Diff.:	1.00	1	L and R equal
Phase Diff.:	-0.15	3	R ahead of L; small
Axis Shift:	-0.13	2	L > R
Slowing L:	0.20	5	slightly longer
Slowing R:	-0.28	2	slightly shorter

18 fps 109 Frame 137%

VGAnalyzer

Program Camera Features Saving

- Visualization of features
- Visualization of vibration
- Automatically Analyze Vibrant Frames

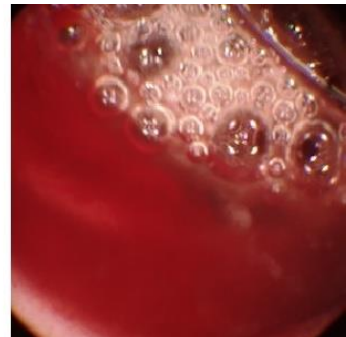
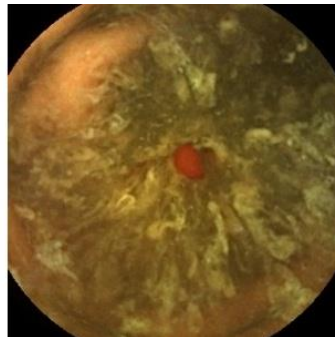
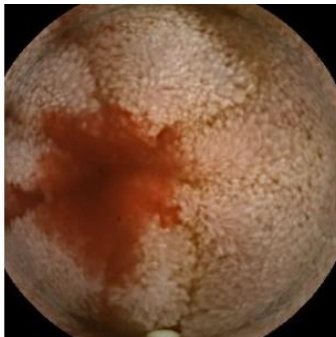
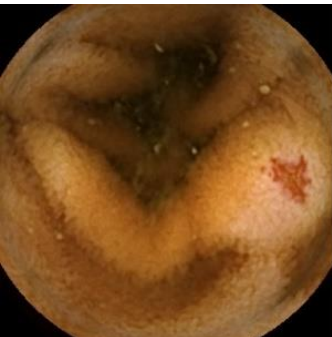
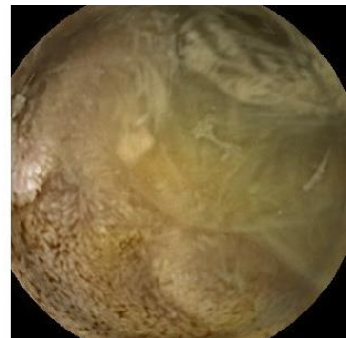
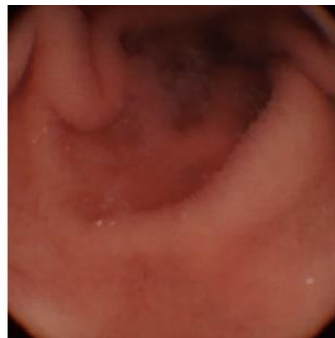
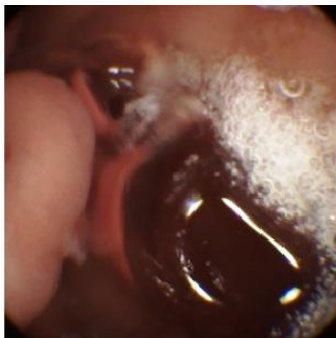
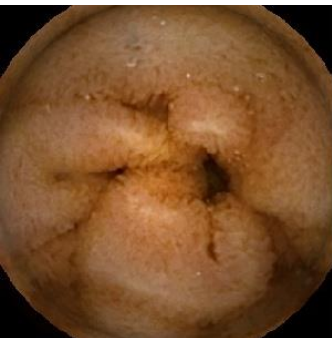
Image calibration

Calibrate

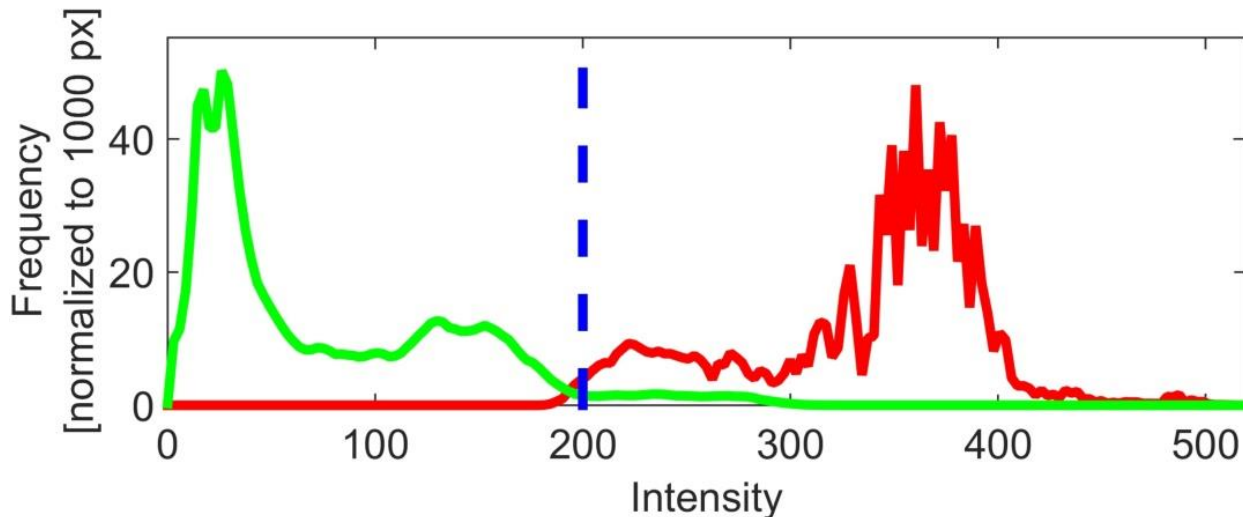
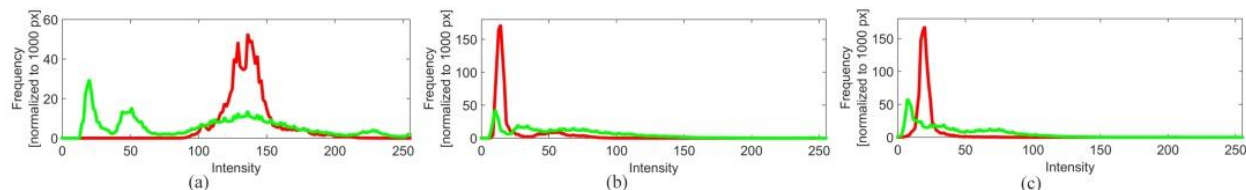
Brightness: 0
Contrast: 1



Detekce krvavých oblastí v tenkém střevě

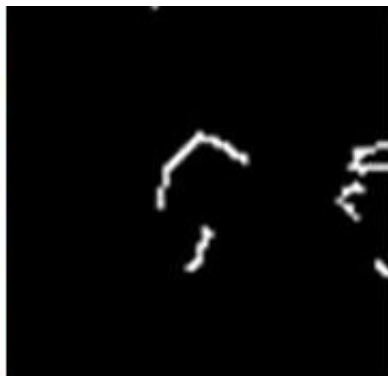


Metoda A - separace ROI od pozadí





Metoda B - morfologie + barva





Method	TP-significant (%)	TP-all (%)	FP (%)
A	92.04	89.74	12.80
A – B	8.26	9.74	9.53
B	86.73	82.82	5.93
B – A	2.95	2.82	2.67
AB	83.78	80.00	3.27
A + B	94.99	92.56	15.47



ENDOanalyzer

Settings for Blood Detection
 Method A
 Method B

Saving the Results
F:/endo/krvaceni/ENDOanalyzer_test ...
Analyze and Save All Frames

-25 Brightness
1.64 Contrast

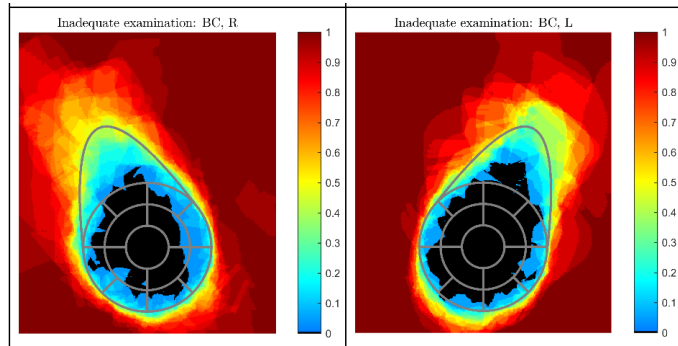
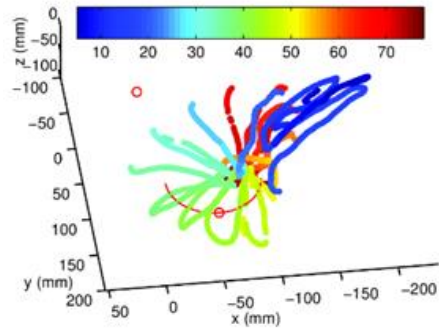
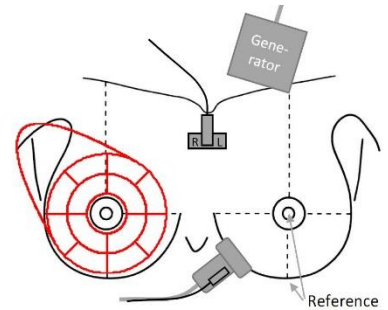
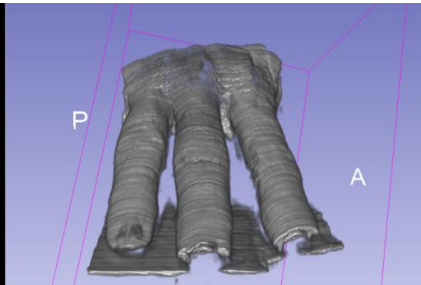
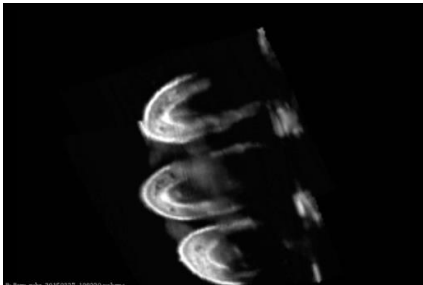
Method A :
Bloody pixels = 1328
.....
Method B :
TURNED OFF

1 fps
7 Threshold
866 Frame

File: F:/endo/krvaceni/ENDOanalyzer_test/00_11_21_492.jpg
X: 106 Y: 0 RGB: 100,73,52 202%



Ultrasonografie





27 lidí

základní a aplikovaný výzkum

výuka na MFF UK, FJFI ČVUT

PhD studenti

CZ & EU projekty

CZ & EU granty

