

LABORATORIJ ZA BIOMEDICINSKE RAČUNALNIŠKE SISTEME IN OSLIKAVE

Raziskovalna področja

- Razvoj razpoznavnih tehnik z namenom avtomatske analize biomedicinskih signalov in slik
- Razvoj standardiziranih podatkovnih baz biomedicinskih vzorcev in mer zmogljivosti za vrednotenje zmogljivosti ter robustnosti razpoznavnih tehnik
- Razvoj biomedicinskih informacijskih tehnologij in programske opreme

Projekti

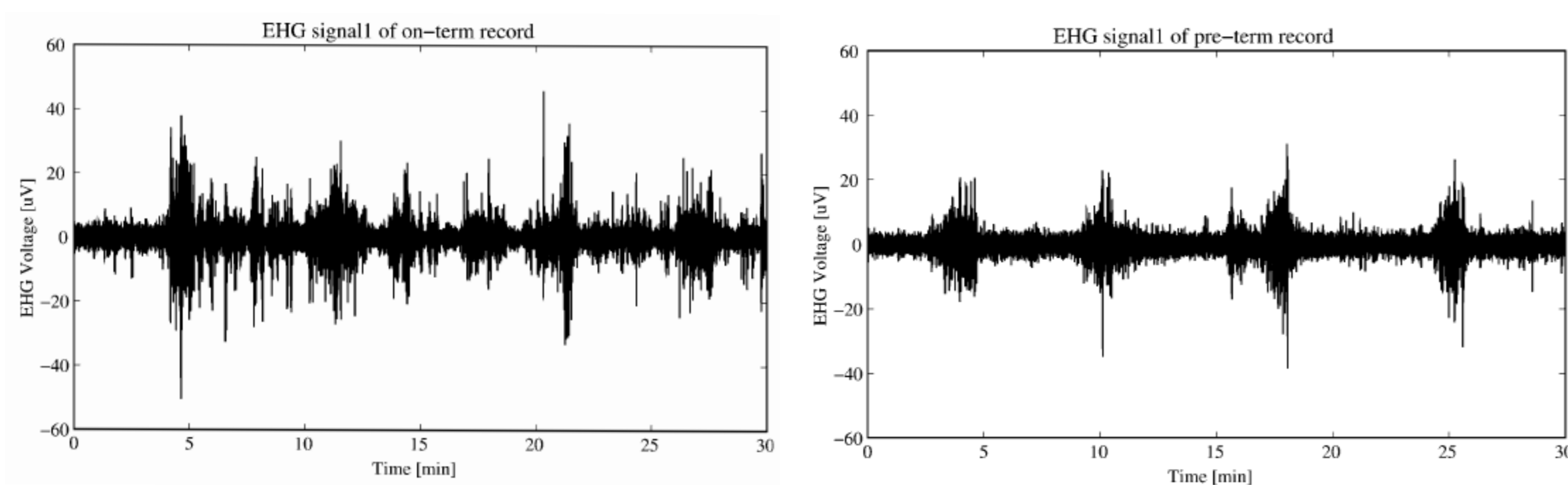
- ARRS: P3-0124, Metabolični in prirojeni faktorji reproduktivnega zdravja, napovedovanje prezgodnjega poroda, II

Raziskovalno sodelovanje

- Harvard-MIT, Division of Health Sciences and Technology, MIT, Cambridge, USA
- Univerzitetni klinični center, Ljubljana, Slovenija

Raziskovalne teme

- **Napovedovanje prezgodnjega poroda z analizo elektrohistorigrama (EHG)**

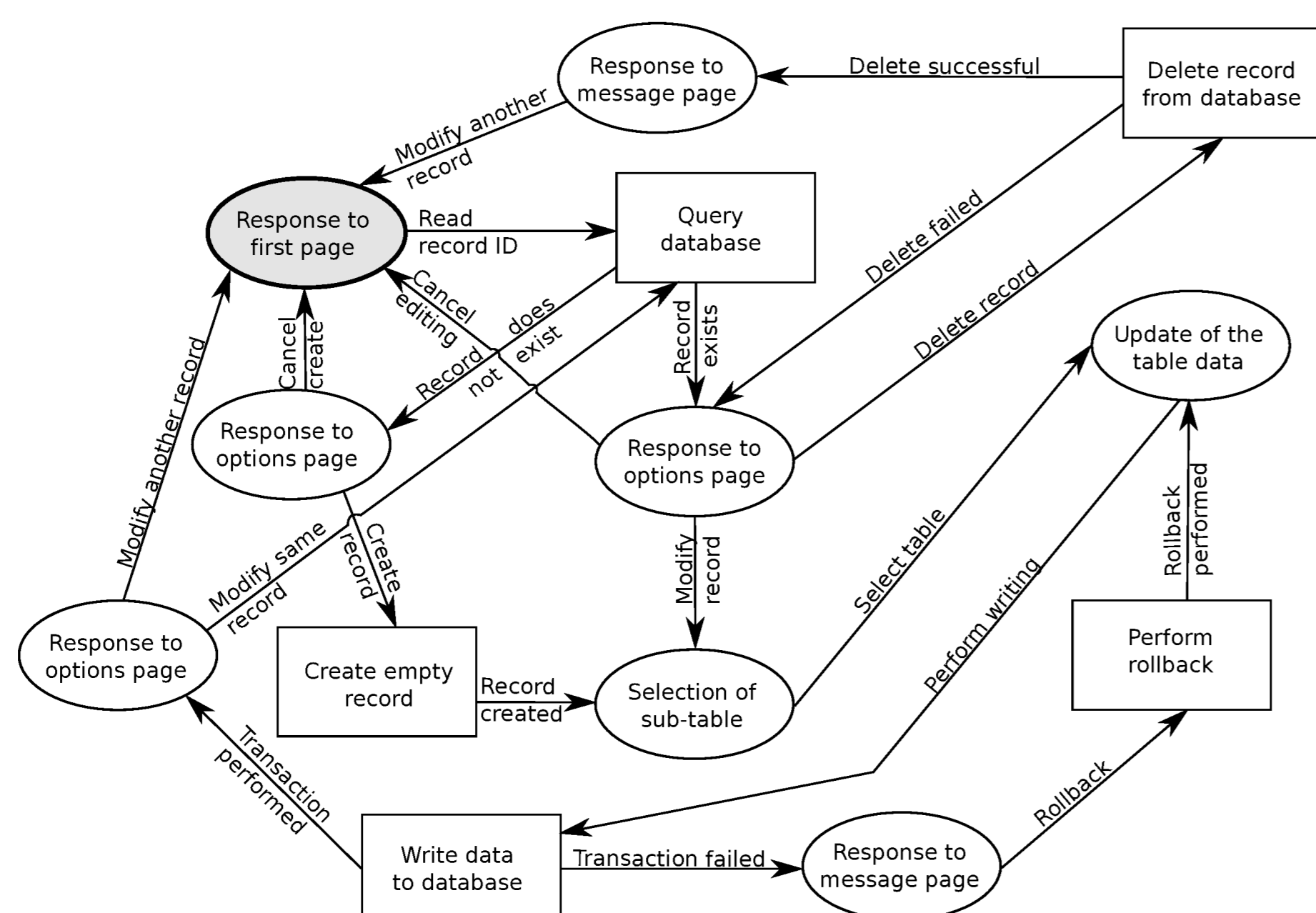


- **Analiza slik retine**

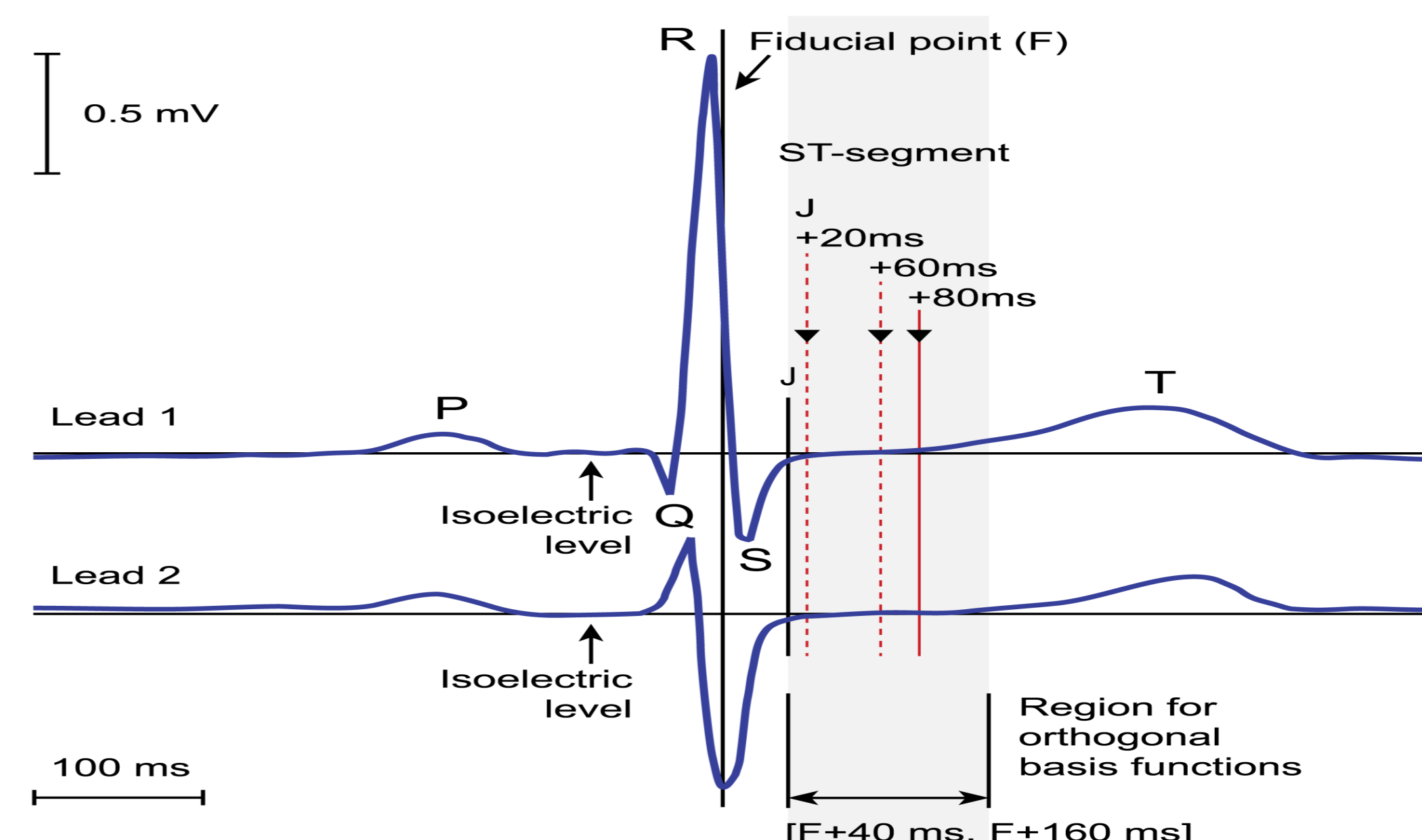
- Detekcija geografskih kontur, detekcija flekov/druz



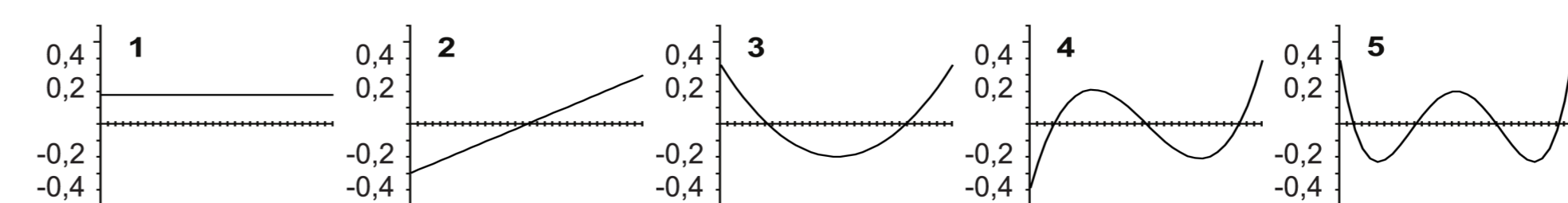
- **Razvoj ogrodja za dinamično generiranje spletnih vmesnikov**



- **Analiza elektrokardiografskih signalov**
- Opisovanje oblik segmenta ST z ortogonalnimi transformacijami

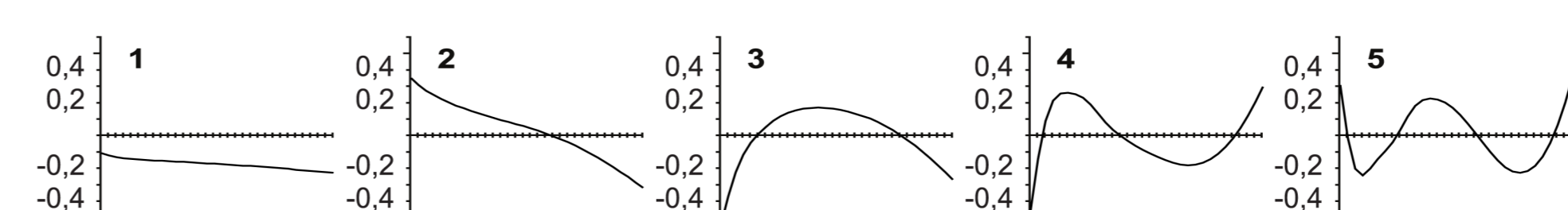


(A) ST segment LPT basis functions spanning over single lead



LPT - Legendre Polynomial Transformation

(B) ST segment KLT basis functions (obtained on LTST DB) spanning over single lead



KLT - Karhunen-Loeve Transformation

Primerjava zmogljivosti algoritma *recg* z nekaterimi drugimi algoritmi na bazi MIT-BIH Arrhythmia.

Algoritem	MIT-BIH A			Gross		
	Št. utripov	FN	FP	Se(%)	PPV(%)	Skupno (%)
Pan and Tomp. (1985)	109809	277	507	99.76	99.57	99.67
Hamilton and Tomp. (1986)	109267	340	248	99.69	99.77	99.73
Martínez <i>et al</i> (2004)	109428	220	153	99.80	99.86	99.83
Ghaffari <i>et al</i> (2008)	110159	120	322	99.91	99.72	99.82
Elgendi (2013)	109985	241	142	99.78	99.87	99.83
Ding <i>et al</i> (2014)	109494	73	134	99.93	99.88	99.91
<i>recg</i>	109494	114	92	99.90	99.92	99.91

Izpostavljeni dosežki

- Razvoj in vzdrževanje mednarodne podatkovne baze Long-Term ST Database (LTST DB, Physionet, MIT) <https://www.physionet.org/physiobank/database/ltstdb/>
- Razvoj in vzdrževanje mednarodne podatkovne baze Term Pre-Term EHG DB (TPEHG DB, Physionet, MIT) <https://www.physionet.org/physiobank/database/tpehgdb/>
- Zmaga na tekmovanju *Robust detection of heart beats in multimodal data* (Computing in Cardiology Conference)

Focus issue entry	Score (%)
Pangerc and Jager (2015)	93.64
Johnson <i>et al</i> (2015)	91.50
Antink <i>et al</i> (2015)	90.70
DeCooman <i>et al</i> (2015)	90.02
Galeotti <i>et al</i> (2015)	89.73
*Vollmer M	89.55
Pimentel <i>et al</i> (2015)	89.13
Mollakazemi <i>et al</i> (2015)	88.85
*Krug J	88.34
Gieraltowski <i>et al</i> (2015)	88.07
C-code sample entry	87.38
M-code sample entry	85.04

Zadnji objavljeni članki (SCI)

- M Amon, F Jager, Electrocardiogram ST-Segment Morphology Delineation Method Using Orthogonal Transformations, PLoS ONE 11(2): e0148814, 2016, doi:10.1371/journal.pone.0148814
- A Trojner Bregar, M Lucovnik, I Verdenik, F Jager, K Geršak and R E Garfield, Uterine electromyography during active phase compared to latent phase of labor at term, Acta Obstetrica et Gynecologica Scandinavica, Vol. 95, pp. 197-202, 2016, doi: 10.1111/aogs.12818
- A J Hussain, P Fergus, H Al-Askar, D Al-Jumeily and F Jager, Dynamic neural network architecture inspired by the immune algorithm to predict preterm deliveries in pregnant women, Neurocomputing, Vol.15(3),pp.963-974,2015.
- U Pangerc and F Jager, Robust detection of heart beats in multimodal records using slope- and peak-sensitive band-pass filters, Physiological measurement, Vol.36(8),pp.1645-1664, 2015.