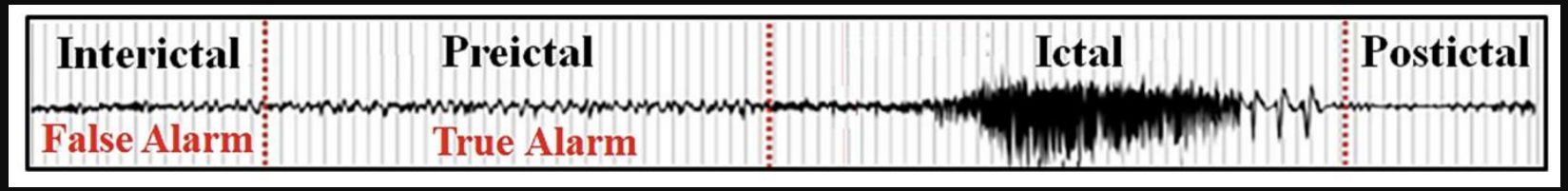
Predikcia epilepsie z EEG záznamov

Vedúci práce: doc. RNDr. Ľubomír Antoni, PhD

Motivácia

- Bakalárska práca
- Praktické využitie



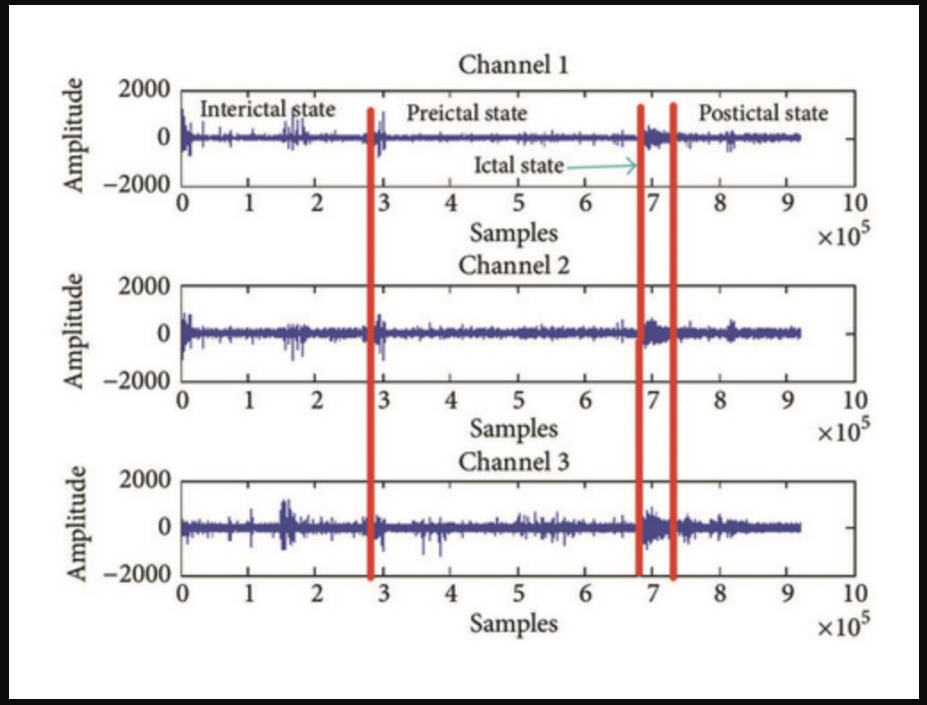
Dataset

- CHB-MIT EEG
- Detskí pacienti
- Rozdiel medzi nahrávkami 1,5 roka
- 22 subjektov (5 mužov, vek 3-22; 17 žien vek 1,5-19)
- Kontinuálne nahrávky
- 23 kanálov
- Dataset pre každého pacienta obsahuje 9-42 nahrávok

Literatúra

Epiletic Seizure Prediction Using Machine Learning Methods – Syed Muhammad Usman, Mohammad Usman, Simon Fog – 2017

- Rovnaký dataset
- Detekcia preiktálneho stavu
- Najlepší model – SVM: 92%, 23 minút



Literatúra

Efficient Epileptic Seizure Prediction Based on Deep Learning – Hisham Daoud, Magdi Bayoumi – 2019

- Multi-Layer Perceptron
- Deep Convolutional Neural Network
- RNN
- Deep Convolutional Autoencoder

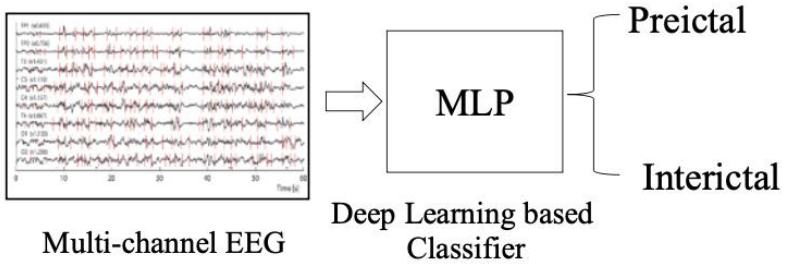


Fig. 2. Block Diagram of MLP based Seizure predictor

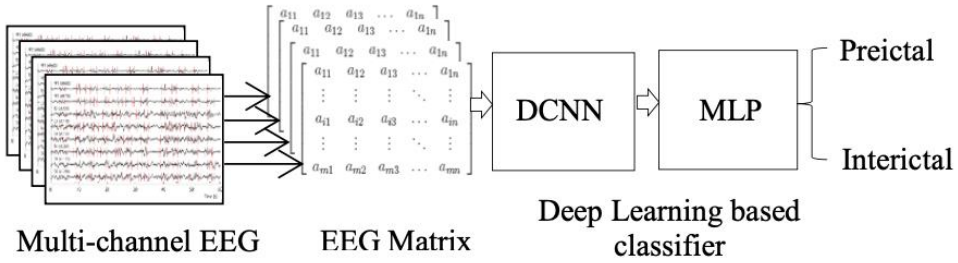


Fig. 3. Block Diagram of DCNN + MLP based Seizure predictor

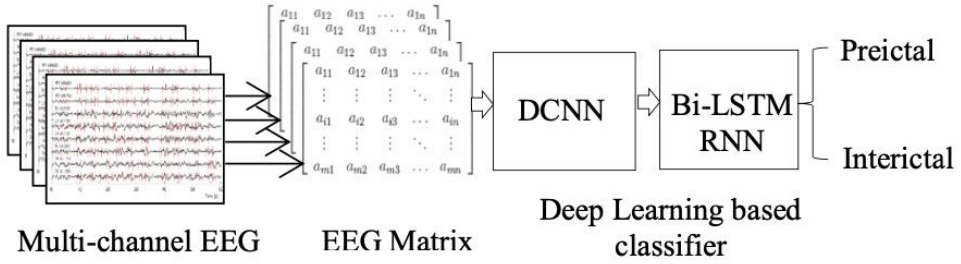


Fig. 4. Block Diagram of DCNN + Bi-LSTM based Seizure predictor

Literatúra

TABLE III
PERFORMANCE EVALUATION OF THE PROPOSED MODELS

Proposed Model	Sensitivity	Specificity	Accuracy	False Alarm h^{-1}	Training Time (min)	No. of Parameters
MLP	84.67%	82.60%	83.63%	0.174	7.3	8,870,291
DCNN + MLP	95.41%	92.80%	94.10%	0.072	12.5	520,477
DCNN + Bi-LSTM	99.72%	99.60%	99.66%	0.004	14.2	27,657
DCAE + Bi-LSTM	99.72%	99.60%	99.66%	0.004	4.25	27,657
DCAE + Bi-LSTM + CS	99.72%	99.60%	99.66%	0.004	2.2	18,345

Postup práce

- Vytvorenie vhodnej reprezentácie datasetu
- Namiesto 5 sekundových okien vyskúšať 10 sekundové
- Autoencoder + klastrovanie
- ResNet
- Personalizovaná sieť
- Optimalizácia