How Al can empower Health in post COVID 19 World

Presented by : Dr. Eng. Sandy RIHANA

Agenda

01 Artificial Intelligence in HealthCare-PostCovid19

02 Artificial Intelligence Applications at USEK



































Drug discovery and development





Case studies Of AI in Healthcare



CardioVascular Case Study





CardioVascular Case Study



Biomedical Signal Processing and

Control



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Heart rate variability analysis using neural network models for automatic detection of lifestyle activities

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Cardio Diagnostics Reinventing Cardiac Care Powered by Talent. Driven by Innovation



Responsive NeuroStimulation Detection Counts 44 % seizure reduction



Advisory System Continuous iEEG recordings External Processing Unit for storage and Analysis



Seizure Detection

Detection Latency, > Late Intervention (too late); Brain already evolved into a Seizure.

Seizure Prediction/Forecasting

 Employ Computational Intelligence Techniques to accurately Predict Seizures

iEEG recordings from 3 dogs available through the iEEG.org portal

Long term recordings (16 electrodes, Fs= 400Hz)

NeuroVista Ambulatory Monitoring device

Total of **978 days of continuous iEEG** recordings...



DATA SPLITTING FOR EACH DOG

Dog ID	# of recording days	# of Seizures	Training and Validation (# of seizures)	Testing (# of seizures)
A0002	451	83	37 days (11)	414 days (72)
A0003	197	27	22 days (7)	175 days (20)
A0004	330	15	26 days (5)	304 days (10)

- Preprocessing: Zero phase band-pass filtering
- ◆ Electrodes Selection: Kmeans-DTF
- Feature Extraction: 14 Prominent traditional univariate features
- ◆ Feature Selection: Genetic Algorithm
- ◆ Classification: Support Vector Machine
- Performance Evaluation: Sensitivity, AUC



SOZ: Seizure onset zone; SEF: Spectral edge frequency; SEP: Spectral edge power;



ICTALS2017: Designing the next generation of closed loop seizure control



ICTALS2017 The Penumbra Conference



Pharmacology Case Study

Permeability across the Blood Brain Barrier (BBB)



Pharmacology Case Study

Design and implement

AIM

Predict whether a drug penetrates the BBB (BBB+) or not (BBB-)

- Predicts whether a drug crosses the BBB or not
- Based on molecular descriptors of the drugs

INPUT FOR DECISION MAKING

Molecular descriptors of drug molecules

In silico BBB model





In silico model

96.26% highest overall accuracy obtained
Higher than the previously reported results
Promising tool for early stage drug discovery

2019 FIRM INTEGRATIONAL CONFERENCE ON Advances in Biomedical Engineering WCABANET MODELS 2019 FIRM INTEGRATION CONFERENCE ON Advances in Biomedical Engineering WCABANET MODELS IN Silico and in vitro Blood-Brain Borvey discovery In Silico and in vitro stage drug discovery

Telemonitoring case study





Scientific Research & Development

Speeding up the treatment Speeding up Drug Discovery Speeding up detection and clinical diagnosis