MULTIMODAL MONITORING IN NEUROCRITICAL CARE

Submitted By: Shreya Gautam
sg3319
MOTIVATION

• Currently: Unimodal analysis of data
• Problem:
  ❑ Several different machines
  ❑ False alarms
  ❑ Large time gap between consecutive monitoring tasks
• Proposal: Multimodal continuous monitoring
• Approach: Combine various datasets intelligently
• Aim: To predict secondary brain insults, brain ischemia
1) Continuous EEG signals: Taken from Bern-Barcelona EEG database.

- Patients suffering from temporal lobe epilepsy.
- Sampling frequency: 1024 Hz.
- Number of samples: 10240.
- Parameters utilized (displaying for 1 patient):
2) Cerebral Microdialysis data:
- 50 patients suffering from Traumatic Brain Injury (TBI).
- Sampling frequency: 0.1 Hz.
- Parameters utilized (displaying for 1 patient):
KEY FACTORS

• Sampling time of all data should be matched.
• Care should be taken such that different data are evaluated at the same time duration.
• Stationary and non-stationary datasets should be evaluated appropriately.
• Easier to remain in the time domain for stationary and non-stationary datasets.
• An inherent associated drawback would be that of time lag present among different machines or the variation in the time precision.
Is lactate level greater than 2umol/L

Is LPR > 40 and Glucose < 1.7 mmol/L and Glycerol > 126 umol/L

Combine this information with alpha/delta ratio of cEEG

Is ratio > 50 %

Yes: Issue second warning
No: Issue first warning

This evaluation is done for i+1 th sample
RESULTS

Number of Warnings issued for each patient

False alarms due to crossing thresholds by individual parameters

First warning when a combination of microdialysis parameters indicate onset of brain ischemia

Second warning when cEEG combined with microdialysis parameters indicate onset of brain ischemia; need of medical attention
REFERENCES


