Database Open Access

EEG During Mental Arithmetic Tasks

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New Database Added: EEGMAT *(Dec. 17, 2018, midnight)*

The EEGMAT database contains EEG recordings of subjects before and during the performance of mental arithmetic tasks.

When using this resource, please cite the original publication:
Zyma I, Tukaev S, Seleznov I, Kiyono K, Popov A, Chernykh M, Shpenkov O. Electroencephalograms during Mental Arithmetic Task Performance. Data. 2019; 4(1):14. https://doi.org/10.3390/data4010014

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Goldberger, A., Amaral, L., Glass, L., Hausdorff, J., Ivanov, P. C., Mark, R., ... & Stanley, H. E. (2000). PhysioBank, PhysioToolkit, and PhysioNet: Components of a new research resource for complex physiologic signals. Circulation [Online]. 101 (23), pp. e215–e220.

Introduction

The database contains EEG recordings of subjects before and during the performance of mental arithmetic tasks.

Study Methods

The EEGs were recorded monopolarly using Neurocom EEG 23-channel system (Ukraine, XAI-MEDICA). The silver/silver chloride electrodes were placed on the scalp according to the International 10/20 scheme. All electrodes were referenced to the interconnected ear reference electrodes.

A high-pass filter with a 30 Hz cut-off frequency and a power line notch filter (50 Hz) were used. All recordings are artifact-free EEG segments of 60 seconds duration. At the stage of data preprocessing, the Independent Component Analysis (ICA) was used to eliminate the artifacts (eyes, muscle, and cardiac overlapping of the cardiac pulsation). The arithmetic task was the serial subtraction of two numbers. Each trial started with the communication orally 4-digit (minuend) and 2-digit (subtrahend) numbers (e.g. 3141 and 42).

The participants were eligible to enroll in the study if they had normal or corrected-to-normal visual acuity, normal color vision, had no clinical manifestations of mental or cognitive impairment, verbal or non-verbal learning disabilities. Exclusion criteria were the use of psychoactive medication, drug or alcohol addiction and psychiatric or neurological complaints.

Data

The data files with EEG are provided in EDF (European Data Format) format. Each subject has 2 files:

- with "_1" suffix -- the recording of the background EEG of a subject (before mental arithmetic task)
- with "_2" suffix -- the recording of EEG during the mental arithmetic task.

The recording datetime information has been set to Jan 01 for all files.

In this experiment all subjects are divided into two groups:

- Group "G" (24 subjects) performing good quality count (Mean number of operations per 4 minutes = 21, SD = 7.4).
- Group "B" (12 subjects) performing bad quality count (Mean number of operations per 4 minutes = 7, SD = 3.6).

In subject-info.csv, the "Count quality" column indicates which subjects correspond to which group (0 - Group "B", 1 - Group "G"). Additionally, subject-info.csv provides basic information about each subject (gender, age, job, date of recording).

Both EDF and EDF+ formats are free and can be viewed using free software such as:

- Polyman (for MS-Windows only; for details, please follow the link) EDFbrowser (for Linux, Mac OS X, and MS-Windows; at

www.teuniz.net)
- LightWAVE and the PhysioBank ATM, platform-independent web applications from PhysioNet
- WAVE and other applications for Linux, Mac OS X, and MS-Windows in the WFDB Software Package, also from PhysioNet
- For using the following EDF files in Python code, we suggest using the PyEDFlib for processing the files (https://github.com/holgern/pyedflib/tree/master/pyedflib).

Contributors

This database was contributed by Igor Zyma, Sergii Tukaev, and Ivan Seleznov, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Department of Electronic Engineering.

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Discovery

DOI (version 1.0.0):
https://doi.org/10.13026/C2JQ1P

Topics:
eeg neuroelectric

Corresponding Author

You must be logged in to view the contact information.

Files

Total uncompressed size: 175.1 MB.

Access the files

- Download the ZIP file (175.1 MB)
- Access the files using the Google Cloud Storage Browser here. Login with a Google account is required.

- Access the data using the Google Cloud command line tools (please refer to the gsutil documentation for guidance): `gsutil -m -u YOUR_PROJECT_ID cp -r gs://eegmat-1.0.0.physionet.org DESTINATION`
- Download the files using your terminal: `wget -r -N -c -np https://physionet.org/files/eegmat/1.0.0/`
- Download the files using AWS command line tools: `aws s3 sync s3://physionet-open/eegmat/1.0.0/ DESTINATION`

Visualize waveforms

Folder Navigation: <base>

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SHA256SUMS.txt	5.9 KB	2019-03-20
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subject-info.csv	1.0 KB	2018-12-12

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