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| Question: | 6/21 (VCEG) | | |
| Source: | **Sam Jelfs**  **Tsvetomira Tsoneva** | Email: | [sam.jelfs@philips.com](mailto:sam.jelfs@philips.com)  [tsvetomira.tsoneva@philips.com](mailto:tsvetomira.tsoneva@philips.com) |
| Title: | **Thoughts on Test Datasets for H.BWC** | | |
| Purpose: | Proposal | | |

1. **Introduction**

The CTCs specify a number of datasets that must be used for evaluating CEs. We believe that the current datasets have both some limitations in terms of their scope, and in some cases high computational costs for encoding and decoding.

# Limitations of Current Datasets

One of the requirements of the CfP was that the system must be able to support both 16- and 24-bit datasets. However, currently all datasets are limited to 16-bits (or 12 bit stored in a 16-bit int). The EDF file format supports a maximum of 16-bit, but the BDF extension supports 24-bit. We have identified 3 potential BDF datasets that could be used for testing the 24-bit handling of the test model:

1. Tilt Illusion
   * <https://openneuro.org/datasets/ds005021/versions/1.2.1>
   * EEG, 36 subjects
2. EEG Meditation:
   * <https://openneuro.org/datasets/ds001787/versions/1.1.1>
   * EEG + events + other signals, 24 subjects
3. Trujillo et al:
   * <https://dataverse.tdl.org/dataset.xhtml?persistentId=doi:10.18738/T8/EG0LJI>
   * EEG+ events+ other signals, 22 subjects

It should be noted that the current test model software does not support reading of BDF files. It may be possible to convert the BDF files to 24-bit WAV files first, but extension of the file parsing to handle native 24-bit BDF files would be preferential.

# Computational Cost

Encoding of the datasets specified in the CTCs is very time consuming, especially the NMR57 dataset. This dataset contains 58 EEG files, with 109 channels, and some files exceeding 1 GB in size. On average, running on a Linux server equipped with Intel Xeon Gold 6226 processors, encoding takes approximately 14,500 seconds (or 4 hours) per file, per operating point, with the largest files at the highest bitrates taking in excess of 7 ¾ hours.

To encode the entire NMR57 dataset at all 22 operating points specified in the CTCs is roughly 4,872 hours of CPU time, or 203 days. This is then doubled to ~400 days to encode with both combined and independent channel coding. Naturally, parallel processing speeds things up considerably, but as the test model is single-threaded the per-file performance cannot be increased, making iterative testing of CEs very time consuming. It may be beneficial to select a subset of this dataset for the CTCs, rather than requiring that the entire dataset be processed.

# Availability of datasets for validation of the standard

The collection of datasets for the development of the standard that have the correct rights to enable all interested parties to access them and fits the requirements of Dicom has not always been straightforward. We feel that it is important to also have sufficient data to use for validation of the standard later, that has not been used during the development phase. These could be additional datasets, or alternatively, where the current datasets are large enough it could be beneficial to partition them into development and validation subsets.

# Conclusions

We propose to include at least one 24-bit dataset into the CTCs for development of the standard, and we ask the experts to consider how we can reduce the computational requirements on CE proponents, as well as to consider how we should ensure that we have sufficient data available for a validation test at the end of the standardization process.

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