Compression of Human Movement Data

Karen L. Troy.1, Moe2, Larry2, and Curley2

1You must put at least the presenting or corresponding author affiliation here

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Email: \*[ktroy@wpi.edu](mailto:ktroy@wpi.edu) \*include just the corresponding author email

#### Introduction

There exists numerous applications for human movement information including virtual reality, wearable electronics, physical therapy and human performance. The utilization of biomechanical understanding to any human movement application depends on the efficient processing and representation of the kinematic data. Yet techniques for dealing with this class of multimedia information has received little attention compared with the mature fields of image, audio, and text. In order to enable the applications listed above, efficient and standard techniques for processing and representing kinematic data are needed. The work deals with the second of those needs, the representation of kinematic data. Representation is more important than processing as processing cannot happen without representation, and consensus is required for useful representation while processing techniques can be customized.

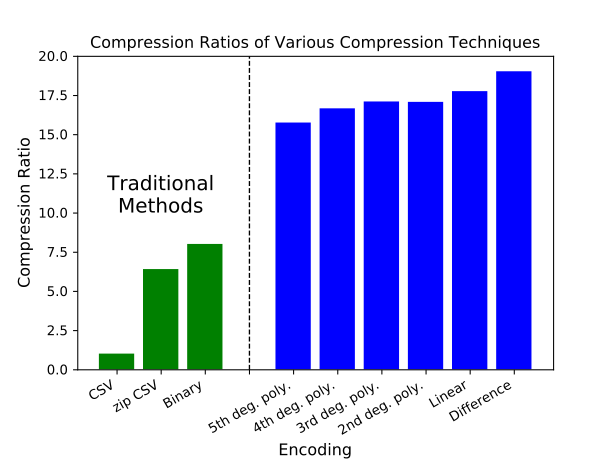
We apply an array of compression techniques utilized in other types of multimedia networks as well as several novel approaches to compress six-axis IMU data of various human movements. The authors hypothesise that the most efficient representation format will utilize mechanical understandings of relationships between rotation and orientation.

#### Methods

In order to meaningfully and repeatable demonstrate the performance of a compression algorithm, a public kinetic signal corpus must be selected. For this study, the Human Gait Database (HuGaDB) is used. HuGaDb is a public dataset of six-axis IMU signals collected from six different body segments of 18 healthy subjects performing 12 different movement activities[TO Cite]. This database was selected because it allowed the comparison of compression techniques across body segment, subject, and activity in addition to sensor modality.

The data collected from three random subjects was designated as training data, and only data from the remaining 15 subjects was used in our results. The training data was used to train the lasso regression of our cross-stream FIR filter discussed later.

For most abstracts, methods should be less than one third of the total amount of text.



**Figure 1**: Compression ratios relative to CSV representation. Higher is better.

#### *(Between sections: keep the 10pt Times New Roman blank line)*

Results and Discussion

#### In general, the results, and their context, importance, and significance should be the emphasis of the abstract. You can either structure this as a result – discussion, result – discussion (for each individual result), or you can summarize your key results/findings, and then have a discussion. Either way, be sure that you explain what your main result is, and how it adds to previous knowledge or compares to what was previously understood about the question that you are asking. If you had hypotheses, be sure to explain how your results support (or do not support) your hypotheses.

Remember the difference between data and results. Data are the information that you collected. In general, it’s good to present data in tables and figures. Results are your interpretation of the data (ie, what do they mean?), and can be written out.

Finish this section by including 2-3 sentences that summarize the main take home point(s) and put your results into a more general context.

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#### Acknowledgments

Acknowledge any sources of support or other important contributors here.

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#### References

Reference citations can be brief, but must include the bare minimum amount of information to locate the reference.

**Formatting**

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A sans serif font (e.g., Arial) is acceptable for figures and tables, but the font must be 9 pt or larger.

The first line of the first paragraph remain aligned with the left margin. Each paragraph after that, within the same section, is indented by 0.2”

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