Corrections for thesis from draft v2.0 to draft v2.75 (pre-submission)

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Abstract

This document presents a log book for the corrections of the draft v2.0 handed on 20 Sep 2018 to Chris Baber (CB). Hand written comments of thesis draft v2.0 of were handed in on 11 Oct 2018. These comments of draft 02 are located in *.../revisions/draft0O2/comments/v2.0/*.pdf*. Then all changes for draft v2.75 by Miguel Xochicale (MX) are located in */phd-thesis/draftrevisions/draft02/draft/v2.75/*.pdf*.

Contents

1 Major corrections

1.1 Cover

1. How well are the research questions shown to be: (a) necessary and (b) novel?
2. What argument for the application of the approaches to H-H-I?

1.2 Chapter 1

1. (pp 8) Can you say how these measures compare?

   (pp. 8)Are entropy measures as good as their models?

2. (pp. 11) What does this tell us?

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   However, such statistical differences cannot capture the structure of the
   time series from each of the participants which performed the movements
   at different frequencies and therefore with different data length
   (see Fig. 10 \cite{guneysu2015} for further details).
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   SORTED: Sat 13 Oct 11:34:10 BST 2018

3. (pp. 15) Add descriptions of contributions to the thesis.

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   Partial work of this thesis has been presented in the following peer-reviewed
   conferences. Author contributions for the publications of
   Miguel Xochicale (MX), Chris Baber (CB) and Mourad Oussalah (MO) are as follow:
   Conceptualisation: MX, CB, MO;
   Data Curation: MX;
   Formal Analysis: MX;
   Funding Acquisition: MX, CB;
   Investigation: MX;
   Methodology: MX;
   Project Administration: MX;
   Resources: CB;
   Software: MX;
   Supervision: CB;
   Validation: MX;
   Verification: MX;
   Writing - Original Draft Preparation: MX;
   Writing - Review: CB, MO; and
   Writing - Editing: MX.
   ```

   SORTED: Sun 14 Oct 13:06:43 BST 2018

1.3 Chapter 2

1. (pp. 21) Expand deterministic chaotic time series!
2. (pp. 24) So ... what is the answer to the 'What to measure' questions?

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Therefore, considering the works
of \cite{vaillancourt2002, vaillancourt2003} and \cite{stergiou2006},
one can quantify movement variablity
based on the complexity and predictability of human movement.
```

SORTED: Mon 15 Oct 09:00:52 BST 2018

3. (pp. 29) how big?

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(up to the scale of $6 \times 10^3$ data points) to ensure
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SORTED: Mon 15 Oct 10:56:56 BST 2018

4. (pp. 31) The chapter just stops... you should add a 'conclusions' paragraph that states the main ideas of that are to be used in the thesis? In particular you could add: why defining embedding parameters is a challenged.

```
\section{Conclusions}
Having reviewed works regarding the questions of: (i) what to quantify in
Movement Variability and (ii) which nonlinear tools are appropriate to quantify
MV and the strengths and weaknesses of nonlinear anayses with
real-world data, it can then be concluded that little research has been done
on the effects with Reconstructed State Spaces (RSSs), Recurrent Plots (RPs),
and Recurrence Quantification Analysis (RQA) metrics for different
embedding parameters, different recurrence thresholds and different
characteristics of time series (window length size, smoothness and structure).
Hence, nonlinear analyses such as estimation of embedding parameters,
RSSs, RPs, and RQAs are reviewed in the following chapter.
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1.4 Chapter 3

1. (pp. 43) This could be explained a little more clearly. Are you suggesting to just read off figures 3.3A and 3.4A, or there is some additional calculation?

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Little has been changed but the distillation of the paragraphs
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2. (pp. 45) perhaps show the final results of this process?

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See Fig. \ref{fig:ssr} that illustrates and describes the method of
reconstructed state space with UTDE.
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3. (pp. 53) Add conclusions for the chapter and connect them to the next one

```
\section{Conclusions}
In this chapter, we introduced fundamentals of nonlinear analyses such
as RSS with UTDE, estimation of embedding parameters with FNN and AMI, RP,
and RQA. Hence, this thesis is only focused on traditional methods
(FNN and AMI) to compute embedding parameters
as this is still an open challenge \citep{uzal2011, gomezgarcia2014}.
However, from the computation of RSSs and RPs in our experiments
(Chapter \ref{chapter4}), facing the real-world time series data issues,
we realise about the importance of the increment not only embedding
parameters \citep{iwanski1998}
but also recurrence thresholds and its effects of 3D surfaces of RQA metrics
(Chapters \ref{chapter5} and \ref{chapter6}).
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1.5 Chapter 4

1. (pp. 1) Method and experiments in this chapter should have all the detail that someone needs to do exactly the same experiment. It should be like a cookery book that gives a recipe for making something. Is everythign in this chapter?

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Generally, sentences of mchapter 4 were distilled!
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2. (pp. 62) is this a real statistic?

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Using a low-pass filter is the common way to either capture the low
frequencies (below 15 Hz) that represent \%99 of the human body
energy or to get the gravitational and body motion components of
accelerations (below 0.3 Hz) \citep{anguita2013}.
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1.6 Chapter 6

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Figures were changed to be more impact and well embedded to
be read better.
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ALL THE FOLLOWING QUESTIONS WERE TACKLE IN CHAPTER 5 and 6 FOR THE FINAL VERSION OF THE THESIS.

1. (pp. 69) What values does this results in ?
2. (pp. 72) need to provide numbers here to support your claim!
3. (pp. 75) We need a more robust terminology to represente these differences; you can't assume that your interpretation of 'smooth' is universal. So, an option is to define smooth as variation of $\pm x$ ...
4. (pp. 75) OK – what you are suggesting is that eye-balling the figures (as you have done) is not objective, so you need RQA ... but I think this argument could introduce this.
5. (pp. 76) so, this is what 'meaningful' means for this thesis?
6. (pp. 78) What is being 'quantified' in RQA – what numbers? could you, for example, report slope or max spread of a line? or use eigen values for the matrix!
7. (pp. 81) 1. The figures need to be better embedded into the text – so you point a figure next to the paragraph discussing it
8. (pp. 81) 2. I worry that much of the evaluation involves looking at the images and this needs the reader to see what you see.
9. (pp. 81) 3. I aslo worry that you haven't fully defined the qualitative categories you use – like 'smooth'
10. (pp. 81) 4. So, are there ways of quantifying the results? And can these numbers be point into the table? How much effect do the variables have on the analysis?
11. (pp. 84) REC,DET, etc embedded into RP

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RQA values are embedded into the RPs
```

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1.7 Chapter 7

1. (pp. 97) Are there consistent variations, do some differences matter more than others?

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Generally, it is evident that time series from different sources
of time series (e.g. participants, movements, axis type, window size lengths
or levels of smoothness) will present differences for not only
computation time of the embedding parameters but also for the
patterns in RSSs, RP, RQAs and 3D surfaces of RQA metrics.
Particularly, we observed that the increase of level of smoothness
of time series created more complex trajectories in the RSSs and
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added more black dots in Recurrence Plots
(see RSSs and RPs sections in Chapters \ref{chapter5} and \ref{chapter6}) ).
With regard to RQA metrics, we observed that DET metric varies little
independently of the time series, and REC and RATIO varied a bit
more but not as much as ENTR metrics for which ENTR metrics are able
to capture any change make in the time series.
```

SORTED: Tue 23 Oct 11:59:39 BST 2018

2. (pp. 98) But by how much?

```
Sentence were modified to:

The weaknesses and strengths of RQA metrics are related to the selection
of embedding parameters, recurrence thresholds and the capacity
of RQA metrics to provide understanding on the dynamics of a time series.
```

SORTED: Tue 23 Oct 12:48:52 BST 2018

3. (pp. 98) increase of what?

```
sentence restated to be less ambigous!
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SORTED: Wed 24 Oct 06:43:17 BST 2018

4. (pp. 98) as RATIO is comprensible, what causes this?
5. (pp. 99) Explain
6. (pp. 100) rewrite question

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\subsection{How the smoothing of raw time series affects the
nonlinear analyses when quantifying MV?}
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7. (pp. 100) What else? (* benefits in the human-humanoid interaction by having the data * why variablity is happening?)
8. (pp. 104) Applications for the approach?

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\subsection*{Applications}
I can foresee many of the published work regarding modeling human movement
variability applied to the context of human-humanoid interaction.
For instance, implementing nonlinear analyses algorithms in humanoid robots
to evaluate the improvement of movement performances \citep{muller2004},
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to quantify and provide feedback of level skillfulness as a function
of movement variability \citep{seifert2011} or to quantify movement
adaptations, pathologies and skill learning
\citep{preatoni2007, preatoni2010, preatoni2013}.
More specifically in the context of human-humanoid rehabilitation
where little work has been done \citep{gorer2013, guneysu2015}
with regards to the use of nonlinear analyses and therefore
provide adequate metrics to quantify and provide feedback
for movement variability.
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2 Minor corrections

These correction are mainly with the use of the English language, suggestions to improve the thesis by CB and some others that improving the visual resutls of the figures.

Chapter 1

`Fixed -- :spellings, typos and corrections of the use of English`

SORTED: Sat 13 Oct 13:49:16 BST 2018

Chapter 2

`Fixed -- :spellings typos and corrections of the use of English`

SORTED: Mon 15 Oct 11:42:31 BST 2018

Chapter 3

`Fixed -- :spellings typos and corrections of the use of English`

SORTED: Mon 15 Oct 15:31:50 BST 2018

Chapter 4

`Fixed -- :spellings typos and corrections of the use of English`

SORTED: Mon 15 Oct 17:31:42 BST 2018

Chapter 6

`Fixed -- :spellings typos and corrections of the use of English`

SORTED: Tue 16 Oct 09:37:47 BST 2018