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SyncMeasure

Manual



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RK CODE SOLUTION

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Introduction

SyncMeasure is a software to measure synchrony between two individuals.

The input is csv file representing two hands movement. The mandatory columns that must be in the csv file are Frame ID and Timestamp, Number of hands in frame, Hand position, Elbow position, Arm position, Grab and Pinch strength. Given these parameters the software can analyze the synchrony using the CVV package. *Philip T. Reiss, Hila Z. Gvirts, Rotem Bennet, Alisa Kanterman, et al.. "A time-varying measure of dyadic synchrony for three-dimensional motion" (2018)*

Available at: http://works.bepress.com/phil_reiss/45/

The software can also combine csv files that contain single hand recordings in order to generate a fake recording of two hands. This can contribute by comparing the fake file to real synchrony file in order to see if the Synchronization is true.

The software is managed at GitHub page: <https://github.com/Romansko/SyncMeasure>

Installation

Prerequisites

1. Install [R] environment v3.4.0. It is important to use exact version. This is necessary for loading and parsing files within the software.
link: <https://cran.r-project.org/bin/windows/base/old/3.4.0/R-3.4.0-win.exe>.
2. Install [R] tools. Currently last version is v35. This is necessary for installing the below [R] packages. link: <https://cran.r-project.org/bin/windows/Rtools/Rtools35.exe>.

3. Install The following [R] packages by opening [R] terminal:

- a. devtools package – needed for installing the cvv package.

Install by running the command:

```
install.packages("devtools")
```

- b. CVV package – needed for measuring cvv between two hands.

Install by running the commands:

```
library(devtools)  
install_github("reissphil/cvv")
```

CVV package homepage - <https://github.com/reissphil/cvv>

- c. data.table package – needed for significantly faster loading and writing csv files.

Install by running the command:

```
install.packages("data.table")
```

Installing SyncMeasure

Simply install with the SyncMeasure installer.

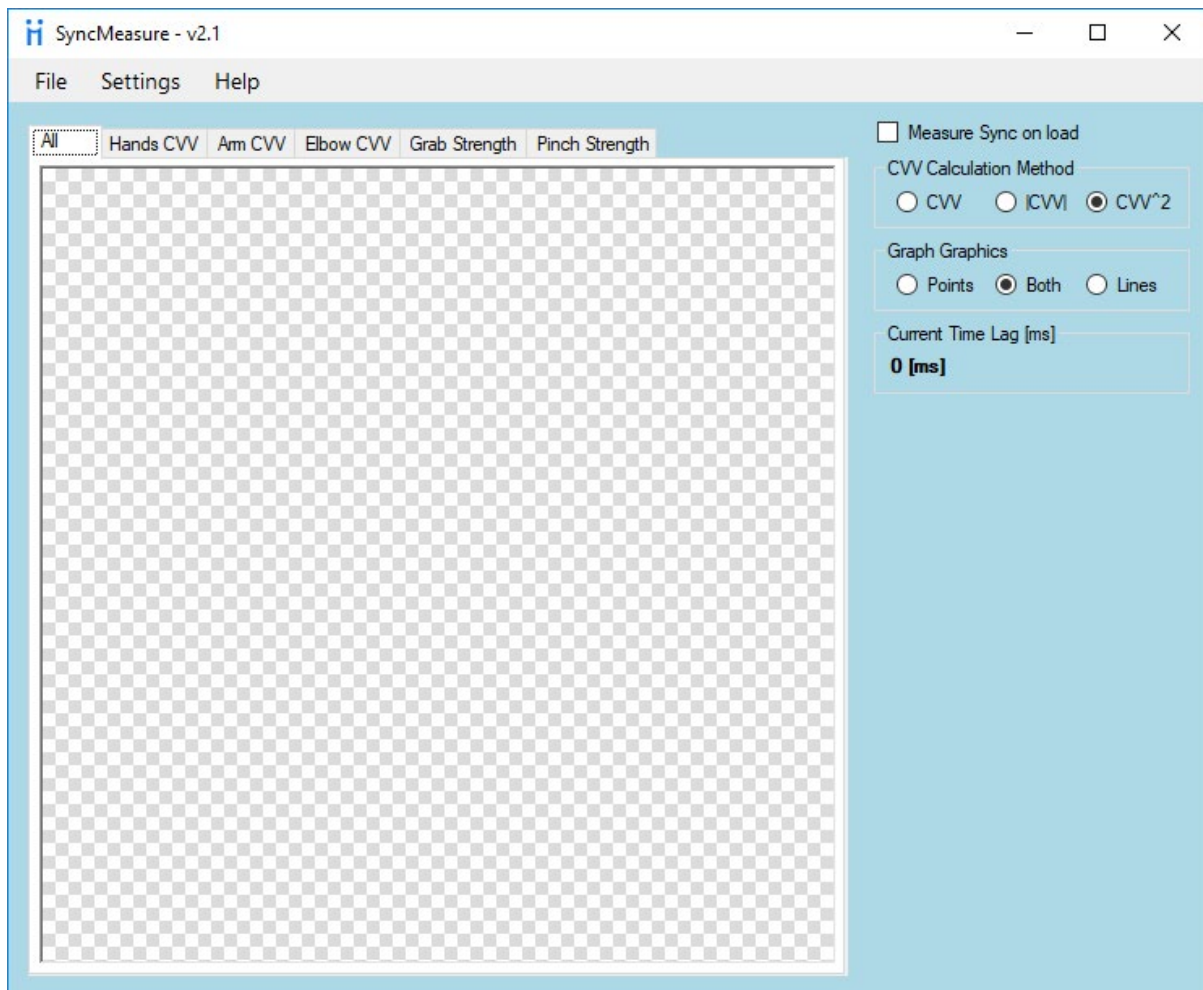
SyncMeasure versions are available at <https://github.com/Romansko/SyncMeasure/releases>.

Latest Version is available at

<https://github.com/Romansko/SyncMeasure/raw/master/Releases/SyncMeasureSetup.exe>

If .NET 4.5.2 Framework is required during the setup, you can install it from: [.NET v4.5.2](#). After .NET framework installation, Install SyncMeasure.

SyncMeasure



Main Form

Loading a single csv file

Loading csv file can be achieved in three ways:

1. File -> Load.
2. Pressing ctrl + L.
3. Dragging the csv file to SyncMeasure form.

Parsing a single csv file

Parsing a csv file can be achieved, after the csv file is loaded, in two ways:

1. File -> Measure.
2. Pressing Enter key.

Parsing multiple csv file

To load and parse multiple csv files, simply press File -> Parse Multiple Files. At the end of the process a report will be generated.

Combine csv files with single hand in frames

The software can combine two csv files which represents single hand movement into one combined csv file that merges the hands movement and updates the hands in frame to be 2.

To do so, open the Combiner Form by File -> Combine.

It is possible to generate the fake csv file starting at initial frame ID of each single-handed csv file. After loading both single-handed files, simply press Merge to combine them.

Combine multiple csv files with single hand in frames

It is possible to combine multiple single-handed files. The selected multiple files will be cross combined meaning that if you select n files, the number of fake generated files will be $n(n-1)$.

To Cross Combine, select File -> Cross Combine.

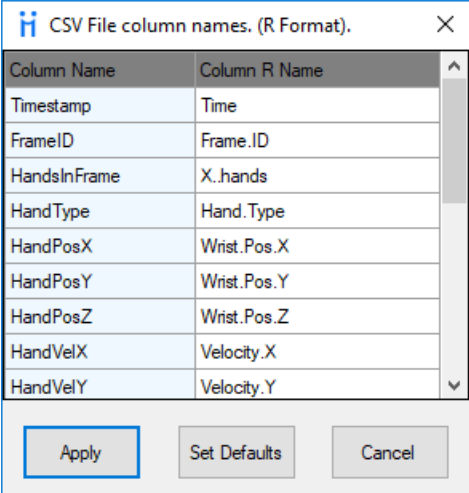
Settings

It is possible to set SyncMeasure settings.

1. Sync Params weights – The params weights that affect the average synchronization can be set using Setting -> Sync Weights.

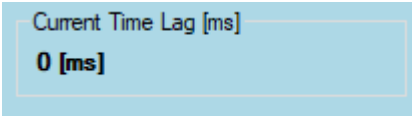
Weight Name	Weight Value	Enabled
Arm	0.3	<input checked="" type="checkbox"/>
Elbow	0.3	<input checked="" type="checkbox"/>
Hand	0.3	<input checked="" type="checkbox"/>
Grab	0.05	<input checked="" type="checkbox"/>
Pinch	0.05	<input checked="" type="checkbox"/>

2. csv file column names – The column names of the mandatory fields can be set using. This is helpful when the controller that outputs the csv file is changed or upgraded. To do so, select Settings -> CSV File Column Names. The names that are inserted automatically will amend to fit [R] format.

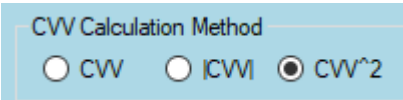


Column Name	Column R Name
Timestamp	Time
FrameID	Frame.ID
HandsInFrame	X.hands
HandType	Hand.Type
HandPosX	Wrist.Pos.X
HandPosY	Wrist.Pos.Y
HandPosZ	Wrist.Pos.Z
HandVelX	Velocity.X
HandVelY	Velocity.Y

3. nBasis – Dimension of B-spline basis used to represent each person's data along each dimension. This value indicates how much we want to filter noises. Minimum value is 4 and means do not consider noises at all. The high the value, the more consideration of voices is taken, and computation time is higher. The default value is 300. To set the nBasis Settings -> Set nBasis.
4. Time Lag [ms] - Lag for person 1 with respect to person 0. E.g., if lag=100, person 1 is assumed to lag behind person 0 by 0.1 second. To set the time lag click on the time lag area in the main form or Settings -> Set Time Lag.

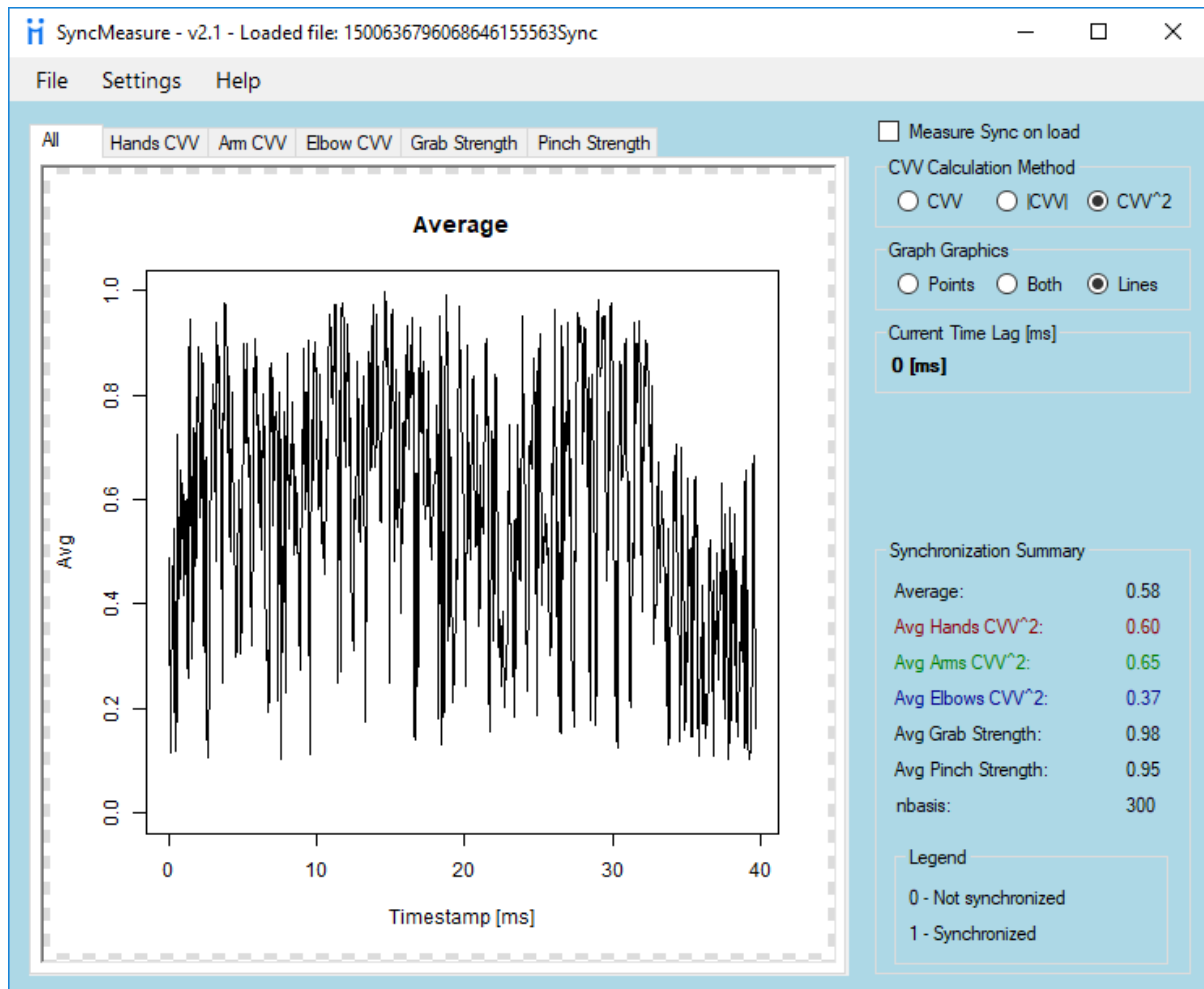


5. CVV Calculation mode – CVV calculation mode can be either regular CVV, absolute value CVV or square CVV. This can be selected in the main form. CVV can be used for regular motion while square CVV can be used when mirrored movement considered as synchronization.



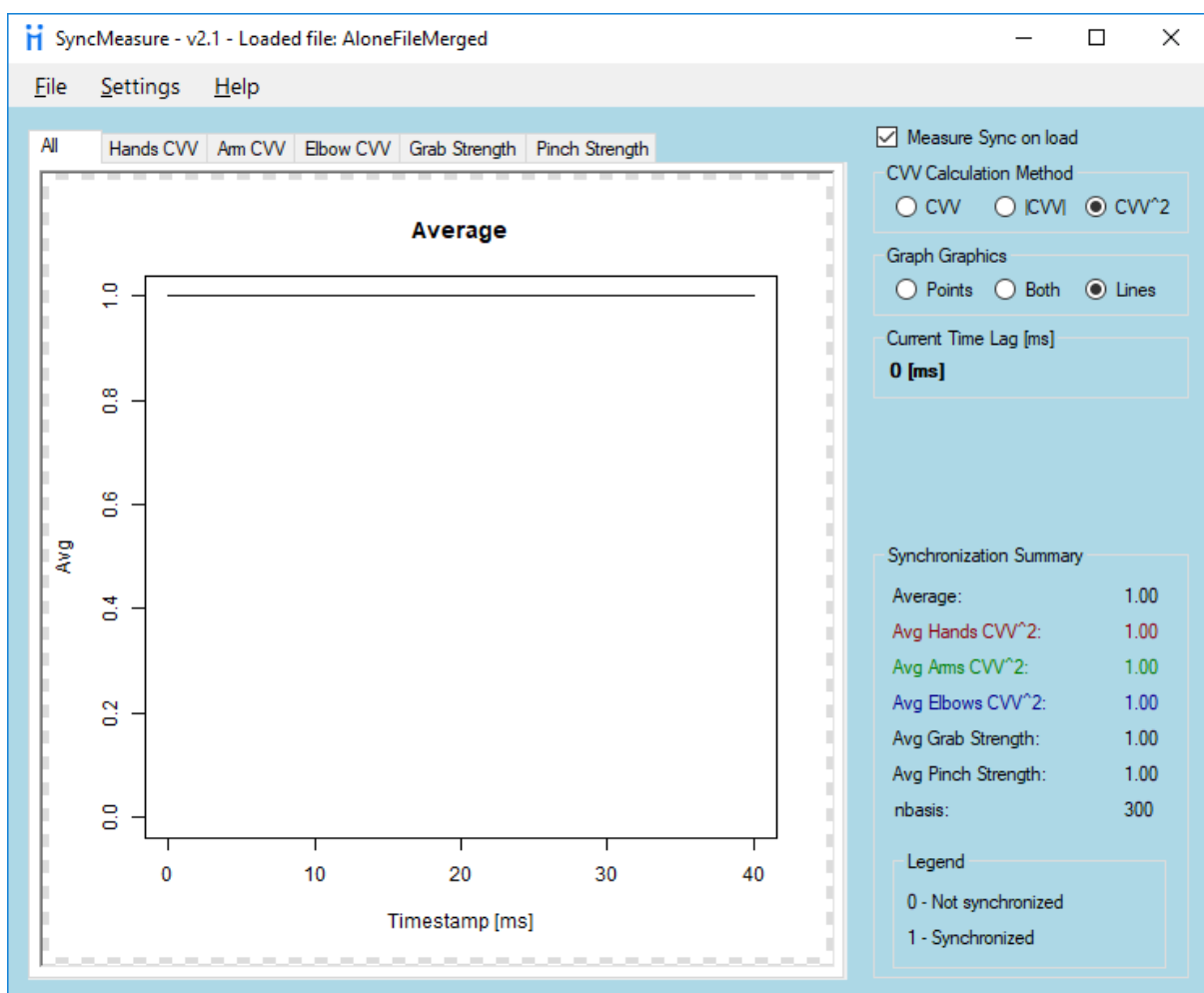
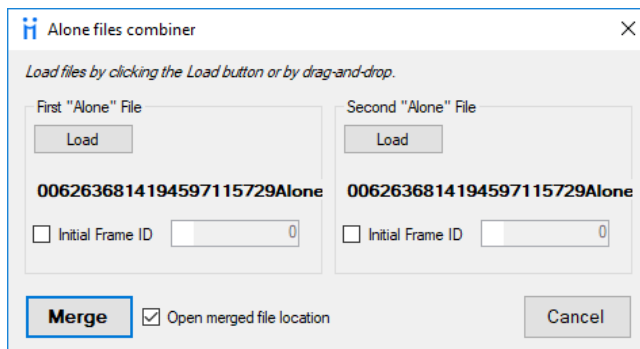
Examples

Parsed Synchronized file



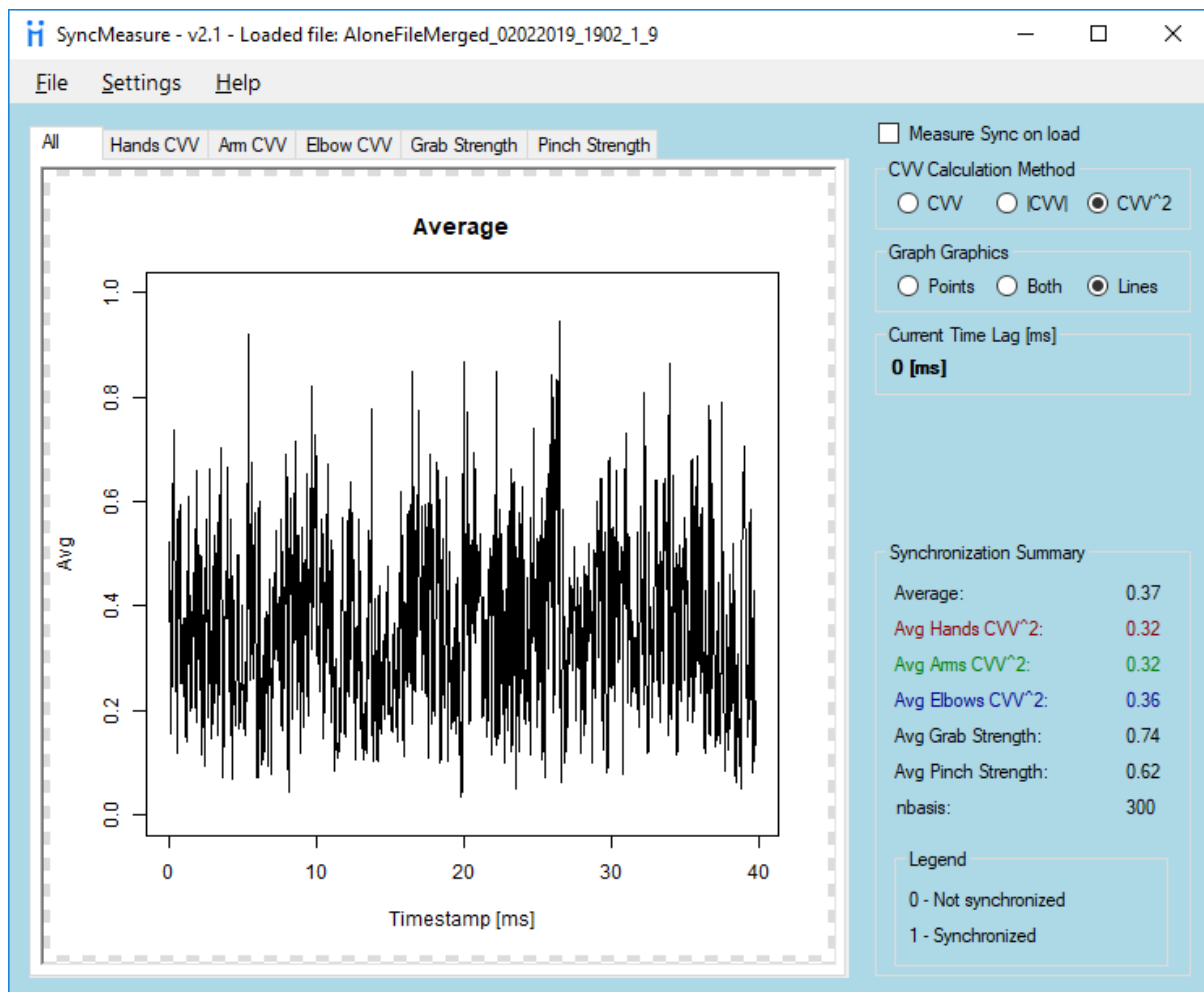
Synchronized file

Combining and Parsing single-handed file with itself



Fully synchronization – combined file with itself.

Combining and Parsing different single-handed files



Fake file – low synchronization

Troubleshooting

If program fails to load, make sure you've followed the steps in the Installation section.

Try to uninstall and delete SyncMeasure folder and reinstall.

Try to open program as administrator.