MATLAB Grader (/)

CONTENTS Close

Assignment 1 - Respiration analysis

Visible: 28 Oct 2024 8:00 AM EET | **Due:** 05 Nov 2024 11:45 PM EET | **Submissions Per Problem:** U

Assignment Description

Respiratory effort belts are widely used to monitor respiration noninvasively and continuously. They are use disorders of the respiratory system, detecting the respiratory muscle dysfunctions and moreover they are cc Additional advantage is that respiratory effort belts do not require the use of a face mask or mouth piece wh

Without calibration, respiratory belts give only qualitative information about the movement of the chest and a respiratory volume and airflow.

The respiratory system can be considered as a simple physical system with two moving parts: the chest and abdomen is equivalent to the volume measured at the mouth. This concept of two degrees forms the basis for instance multiple linear regression.

A prediction of the respiratory airflow, Fest, is commonly calculated from the respiratory effort belt signals by baseline model can be established by fitting the following linear model to the time-synchronized signals:

$$F\_est = \beta\_1 \, s\_ch + \beta\_2 \, s\_ab + \varepsilon$$

where the regressor variables s_ch and s_ab are the respiratory effort belt signals from the chest and abdor regression coefficients. In this baseline model, one sample of each regressor variable is used at a time to pr regressor variables if necessary, for example second order terms (s_ch^2 and s_ab^2) and/or cross-produc

Your task in this assignment is to study and test different prediction models, to evaluate their performance, a

Data

Movements of the chest and abdomen were measured with the respiratory effort belts [au] (au = arbitrary ur measured at the same time. The spirometer signal is already time-synchronized with the respiratory effort b signals, and 100 Hz for the spirometer signal.

NOTE: In this first assignment, the signals are heavily filtered so that they would be smooth and algorithms not acceptable as it distorts signals too much.

Useful MATLAB commands:

load, resample, length, mean, sum, power, sqrt, corr, figure, subplot, plot, xlabel, ylabel, title, linspace, hold

References

1. Konno K, Mead J (1967) Measurement of the separate changes of chest and abdomen during breathing.

2. Montgomery DC, Peck EA, Vining GG (2001) Introduction to linear regression analysis. 3rd edition. John

Problems

Assignment 6 - Frequency-Domain Analysis of Heart Sounds (/courses/157000-521273s-biosignal-processing-i-online-labs-autumn-2024/assignments/449070-assignment-6-frequency-domain-analysis-of-heart-sounds)

Resample spirometer data (/courses/157000-521273s-biosignal-processing-i-online-labs-autumn-2024/assignments/449045-assignment-1-respiration-analysis/problems/1664165-resample-spirometer-data)

Predict respiratory airflows (/courses/157000-521273s-biosignal-processing-i-online-labs-autumn-2024/assignments/449045-assignment-1-respiration-analysis/problems/1664170-predict-respiratory-airflows)

Evaluate model performances (/courses/157000-521273s-biosignal-processing-i-online-labs-autumn-2024/assignments/449045-assignment-1-respiration-analysis/problems/1664175-evaluate-model-performances)