2 *%SmartEye Processing for*

3 *%MultiModalBioSignalAnalysis MMBSA*

4 *%Bachelor Thesis Guillermo Hidalgo Gadea*

5 *%Fatigue detection based on multimodal biosignal analysis*

6 *%---------------------------------------------------------*

7

8 *%% load Metadata for StartDriving and Microsleep*

9 clc;

10 FILENAME = 'F:\Recordings\MetaData\MetaData.xlsx';

11 DELIMITER = '\t';

12 [num, txt, raw] = xlsread(FILENAME);

13 METADATA = raw;

14 SUBJECTS = raw(:,1);

15

16 *%% SmartEye*

17 fprintf('Reading SmartEye Files... \n');

18 PATH = 'F:\Recordings\SmartEyePro\forMatlab\'; *%changed for testing*

19 files = dir('F:\Recordings\SmartEyePro\forMatlab\\*.log'); *%changed for testing*

20 files = strvcat(files.name);

21 x = size(files);

22 **for** i = 1:x(1)

23 *%start timer*

24 tic

25

26 *%read .log file*

27 FILE = [PATH files(i,:)];

28 [a,name,b] = fileparts(FILE);

29 fprintf('Filenumber: %d', i);

30 fprintf('\n');

31 fprintf('Filename: %s', name);

32 fprintf('\n');

33 A = dlmread(FILE, DELIMITER, 1,0);

34

35 *%separate colums*

36 fprintf('Seperating Data...\n');

37 FRAMENUMBER = A(:,1);

38 TIMESTAMP = A(:,2);

39 FRAMERATE = A(:,4);

40 EYELIDOPENING = A(:,6);

41 EYELIDOPENINGQ = A(:,7);

42 PUPILDIAMETER = A(:,23);

43 PUPILDIAMETERQ = A(:,24);

44 FILTEREDPUPILDIAMETER = A(:,29);

45 FILTEREDPUPILDIAMETERQ = A(:,30);

46

47 *%calculate time vector with seconds since start*

48 fprintf('Creating Timeline...\n');

49 SECONDSSINCESTART = zeros(size(TIMESTAMP)); *%generates placeholder array*

50 **for** j = 2:size(TIMESTAMP,1)

51 SECONDSSINCESTART(j)= [(TIMESTAMP(j)-TIMESTAMP(1))\*10^-7]; *%replaces elements in array with differences from Timestamp*

52 **end**

53

54 *%take StartTime from filename*

55 fprintf('Adjusting Timeline...\n');

56 STARTTIME = sscanf(name(10:15),'%s'); *%get starting Time from filename*

57 STARTTIME = num2str(STARTTIME);

58 HOURS = str2num(sscanf(STARTTIME(1:2), '%s')); *%extract HOURS from*

*Filename*

59 MINUTES = str2num(sscanf(STARTTIME(3:4), '%s')); *%extract MINUTES from*

*Filename*

60 SECONDS = str2num(sscanf(STARTTIME(5:6), '%s')); *%extract SECONDS from*

*Filename*

61 STARTTIME = HOURS\*60\*60+MINUTES\*60+SECONDS; *%create STARTTIME scalar in seconds*

62

63 *%create Timeline*

64 TIME = STARTTIME + SECONDSSINCESTART; *%add scalar to vector*

*SECONDSSINCESTART*

65

66 *% create Matrix*

67 fprintf('Creating Matrix...\n');

68 B = horzcat(TIME, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);

69 BHEADER = 'TIME TIMESTAMP FRAMENUMBER FRAMERATE EYELIDOPENING EYELIDOPENINGQ PUPILDIAMETER PUPILDIAMETERQ FILTEREDPUPILDIAMETER FILTEREDPUPILDIAMETERQ';

70

71 *%get start driving from MetaData*

72 SUBJECT = strcmp(name(end-4:end), SUBJECTS); *%search subject name in*

*MetaData*

73 SUBJECTROW = find(SUBJECT == 1);

74 STARTDRIVINGTIME = METADATA{SUBJECTROW,3};

75 ENDDRIVINGTIME = METADATA{SUBJECTROW,4};

76

77 *%find STARTDRIVINGTIME and ENDDRIVINGTIME in Timeline*

78 TIME1 = find(TIME <= STARTDRIVINGTIME); *%if no direct match, find next best measurement*

79 TIME1 = max(TIME1); *% find element directly before STARTDRIVINGTIME*

80 **if** STARTDRIVINGTIME < TIME(1) *%in cases recording starts after*

*STARTDRIVING or stops bejore ENDDRIVING*

81 TIME1 = TIME(1);

82 **end**

83 TIME2 = find(TIME >= ENDDRIVINGTIME); *%if no direct match, find next best measurement*

84 TIME2= min(TIME2); *% find element directly after ENDDRIVINGTIME*

85 **if** ENDDRIVINGTIME > TIME(end) *%in cases recording starts after*

*STARTDRIVING or stops bejore ENDDRIVING*

86 TIME2 = TIME(end);

87 **end**

88

89 *%cut Matrix*

90 B = B(TIME1:TIME2,:);

91

92 *%write to csv*

93 fprintf('Writing file...\n');

94 CSVfile = strcat('F:\Processed\Test\',name(end-4:end),'\_pupil\_eyelid','. csv');*%where to store the outputs...*

95 dlmwrite(CSVfile, B,'precision','%10.5f'); *%missing header*

96 fprintf('Done! ');

97

98 *%elapsed time in loop*

99 toc

100

101 *%clear variables after loop*

102 clearvars -except i PATH files x DELIMITER METADATA SUBJECTS

103

104 **end**

2 *%Movisens Processing for*

3 *%MultiModalBioSignalAnalysis MMBSA*

4 *%Bachelor Thesis Guillermo Hidalgo Gadea*

5 *%Fatigue detection based on multimodal biosignal analysis*

6 *%---------------------------------------------------------*

7

8 *%% load Metadata for StartDriving and Microsleep*

9 clc;

10 FILENAME = 'F:\Recordings\MetaData\MetaData.xlsx';

11 DELIMITER = '\t';

12 [num, txt, raw] = xlsread(FILENAME);

13 METADATA = raw;

14 SUBJECTS = raw(:,1);

15

16 *%% Movisens HRV*

17 fprintf('Reading Movisens Files...\n');

18 PATH = 'F:\Recordings\HeartRate\forMatlab\';

19 folders = dir(PATH);

20 folders = strvcat(folders.name);

21 x = size(folders);

22 **for** i = 3:x(1) *%first outputs . and .. so start with 3*

23 *%start timer*

24 tic

25

26 *%look for XML in folders*

27 PATHi = strcat(PATH, folders(i,:), '\\*.xml');

28 files = dir(PATHi);

29 files = strvcat(files.name);

30 PATHi = strcat(PATH, folders(i,:), '\', files);

31

32 *%folder beeing alanyzed*

33 name = folders(i,:);

34 fprintf('Filenumber: %d', i-2);

35 fprintf('\n');

36 fprintf('Filename: %s', name);

37 fprintf('\n');

38

39 *%get ecg starttime and samplerate*

40 fprintf('Creating Timeline...\n');

41 CLOCK = unisens\_get\_timestampstart(PATHi);

42 HOURS = CLOCK(4);

43 MINUTES = CLOCK(5);

44 SECONDS = CLOCK(6);

45 STARTTIME = SECONDS + MINUTES\*60 + HOURS\*60\*60;

46 SAMPLERATE = unisens\_get\_samplerate(PATHi, 'ecg.bin');

47

48 *%get start driving from MetaData*

49 SUBJECT = strcmp(name(end-9:end-5), SUBJECTS); *%search subject name in*

*MetaData*

50 SUBJECTROW = find(SUBJECT == 1);

51 STARTDRIVINGTIME = METADATA{SUBJECTROW,3};

52 ENDDRIVINGTIME = METADATA{SUBJECTROW,4};

53

54 *%get ecg data*

55 DRIVINGTIME = ENDDRIVINGTIME - STARTDRIVINGTIME; *%driving time in seconds*

56 POS = (STARTDRIVINGTIME - STARTTIME) \* SAMPLERATE; *%difference between recording start and start driving in seconds multiplied by samplerate equals measurement number*

57 LENGHT = DRIVINGTIME \* SAMPLERATE; *%number of measures equals driving time*

*multiplied by measures/second*

58 RANGE = [POS, LENGHT];

59 C = unisens\_get\_data(PATHi,'ecg.bin', RANGE);

60

61 *%create Timeline*

62 TIME = C;

63 **for** j = 1:LENGHT

64 TIME(j) = [STARTDRIVINGTIME + j/1024];

65 **end**

66

67 *% create Matrix*

68 D = horzcat(TIME, C);

69 DHEADER = 'TIME ecg';

70

71 *%write to csv*

72 fprintf('Writing file...\n');

73 CSVfile = strcat('F:\Processed\Movisens\',name(end-9:end-5),'\_ecg','. csv');*%where to store the outputs...*

74 dlmwrite(CSVfile, D,'precision','%10.5f'); *%missing header*

75 fprintf('Done!\n');

76

77 *%look for XLSX in folders*

78 PATHj = strcat(PATH, folders(i,:), '\\*.xlsx');

79 files = dir(PATHj);

80 files = strvcat(files.name);

81 PATHj = strcat(PATH, folders(i,:), '\', files);

82

83 *%folder beeing alanyzed*

84 name = folders(i,:);

85 fprintf('Filenumber: %d', i-2);

86 fprintf('\n');

87 fprintf('Filename: %s', name);

88 fprintf('\n');

89

90 *%get hrv data*

91 [num, txt, raw] = xlsread(PATHj);

92 DATE = datestr(num(:,5));

93 CLOCK = DATE(:,13:20);

94 x = datetime(CLOCK);

95 [h,m,s] = hms(x);

96 TIME = s+m\*60+h\*60\*60; *%TIME is Timeline in seconds*

97

98 *%extract relevant Parameters analyzed by movisens*

99 HR = num(:,10);

100 HrvHf = num(:,11);

101 HrvLf = num(:,12);

102 HrvLfHf = num(:,13);

103 HrvPnn50 = num(:,14);

104 HrvRmssd = num(:,15);

105 HrvSd1 = num(:,16);

106 HrvSd2 = num(:,17);

107 HrvSd2Sd1 = num(:,18);

108 HrvSdnn = num(:,19);

109 HrvSdsd = num(:,20);

110

111 *%create matrix*

112 HRV = horzcat(TIME, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd);

113

114 *% get start driving from MetaData*

115 SUBJECT = strcmp(name(end-9:end-5), SUBJECTS); *%search subject name in*

*MetaData*

116 SUBJECTROW = find(SUBJECT == 1);

117 STARTDRIVINGTIME = METADATA{SUBJECTROW,3};

118 ENDDRIVINGTIME = METADATA{SUBJECTROW,4};

119

120 *%find STARTDRIVINGTIME and ENDDRIVINGTIME in Timeline*

121 TIME1 = find(TIME <= STARTDRIVINGTIME); *%if no direct match, find next best measurement*

122 TIME1 = max(TIME1); *% find element directly before STARTDRIVINGTIME*

123 **if** STARTDRIVINGTIME < TIME(1) *%in cases recording starts after*

*STARTDRIVING or stops bejore ENDDRIVING*

124 TIME1 = TIME(1);

125 **end**

126 TIME2 = find(TIME >= ENDDRIVINGTIME); *%if no direct match, find next best measurement*

127 TIME2= min(TIME2); *% find element directly after ENDDRIVINGTIME*

128 **if** ENDDRIVINGTIME > TIME(end) *%in cases recording starts after*

*STARTDRIVING or stops bejore ENDDRIVING*

129 TIME2 = TIME(end);

130 **end**

131

132 *%cut matrix*

133 HRV = HRV(TIME1:TIME2,:); *%Matrix contains NaN, use ~(isnan(HRV)) for later calculations*

134

135 *%write to csv*

136 fprintf('Writing file...\n');

137 CSVfile = strcat('F:\Processed\MovisensAnalyzer\',name(end-9:end-

5),'\_hrv','.csv');*%where to store the outputs...*

138 dlmwrite(CSVfile, HRV,'precision','%10.5f'); *%missing header*

139 fprintf('Done!\n');

140

141 *%elapsed time in loop*

142 toc

143

144 *%clear variables after loop*

145 clearvars -except i PATH folders x DELIMITER METADATA SUBJECTS

146

147 **end**

148

149 fprintf('Data Processing completed!');

150

1 *%---------------------------------------------------------*

2 *%Merging Files for*

3 *%MultiModalBioSignalAnalysis MMBSA*

4 *%Bachelor Thesis Guillermo Hidalgo Gadea*

5 *%Fatigue detection based on multimodal biosignal analysis*

6 *%---------------------------------------------------------*

7

8 *%% load Metadata for StartDriving and Microsleep*

9 clc;

10 FILENAME = 'F:\Recordings\MetaData\MetaData.xlsx';

11 DELIMITER = '\t';

12 [num, txt, raw] = xlsread(FILENAME);

13 METADATA = raw;

14 SUBJECTS = raw(:,1);

15

16 *%% match SmartEye & Movisen matrix*

17 fprintf('Merging SmartEye and Movisens Files...\n');

18 PATH1 = 'F:\Processed\SmartEye\';

19 PATH2 = 'F:\Processed\Movisens\';

20 PATH3 = 'F:\Processed\MovisensAnalyzer\';

21

22 *%search SmartEye directory for subjects*

23 files = dir('F:\Processed\SmartEye\\*.csv');

24 files = strvcat(files.name);

25 x = size(files);

26 **for** i = 1:x(1)

27 *%start timer*

28 tic

29

30 *%read SmartEye .csv file*

31 FILE = [PATH1 files(i,:)];

32 [a,name,b] = fileparts(FILE);

33 fprintf('loading SmartEye File ...');

34 fprintf('\n');

35 fprintf('filename: %s', name); *% name = vpxxx\_pupil\_eyelid.csv*

36 fprintf('\n');

37 E = dlmread(FILE);

38 TIME1 = E(:,1);

39

40 *%get driving time from MetaData*

41 SUBJECT = strcmp(name(1:5), SUBJECTS); *%search subject name in MetaData*

42 SUBJECTROW = find(SUBJECT == 1);

43 STARTDRIVINGTIME = METADATA{SUBJECTROW,3};

44 ENDDRIVINGTIME = METADATA{SUBJECTROW,4};

45 DRIVINGTIME = ENDDRIVINGTIME - STARTDRIVINGTIME;

46

47 *%read Movisens .csv file*

48 fprintf('loading Movisens File ...\n');

49 FILE = strcat(PATH2, name(1:5), '\_ecg.csv'); *%difference between srtcat and []?*

50 fprintf('filename: %s', FILE(end-12:end-4));

51 fprintf('\n');

52 F = dlmread(FILE);

53 TIME2 = F(:,1);

54

55 *%read MovisensAnalyzer .csv file*

56 fprintf('loading Hrv File ...\n');

57 FILE = strcat(PATH3, name(1:5), '\_hrv.csv');

58 fprintf('filename: %s', FILE(end-12:end-4));

59 fprintf('\n');

60 HRV = dlmread(FILE);

61 TIME3 = HRV(:,1);

62

63 *%create common Timeline*

64 Hz = 100; *%set samplerate*

65 x = DRIVINGTIME \* Hz; *%leght of TIMELINE with given samplerate*

66 TIMELINE = TIME2(1:x); *%create new timeline recycling TIME2, array to large to be created?*

67 TIMELINE(1) = STARTDRIVINGTIME; *%defining Start time = STARTDRIVINGTIME, same as TIME1 and TIME2*

68

69 **for** i = 2:x *%#ok<FXSET>*

70 TIMELINE(i) = TIMELINE(i-1) + 1/Hz; *%create TIMELINE with given samplerate*

71 **end**

72

73 *%create placeholder arrays with predefined TIMELINE*

74 TIMESTAMP = TIMELINE;

75 FRAMENUMBER = TIMELINE;

76 FRAMERATE = TIMELINE;

77 EYELIDOPENING = TIMELINE;

78 EYELIDOPENINGQ = TIMELINE;

79 PUPILDIAMETER = TIMELINE;

80 PUPILDIAMETERQ = TIMELINE;

81 FILTEREDPUPILDIAMETER = TIMELINE;

82 FILTEREDPUPILDIAMETERQ = TIMELINE;

83 ECG = TIMELINE;

84 HR = TIMELINE;

85 HrvHf = TIMELINE;

86 HrvLf = TIMELINE;

87 HrvLfHf = TIMELINE;

88 HrvPnn50 = TIMELINE;

89 HrvRmssd = TIMELINE;

90 HrvSd1 = TIMELINE;

91 HrvSd2 = TIMELINE;

92 HrvSd2Sd1 = TIMELINE;

93 HrvSdnn = TIMELINE;

94 HrvSdsd = TIMELINE;

95

96 *%replace firts entry in arrays with STARTDRIVING values*

97 TIMESTAMP(1) = E(1,2);

98 FRAMENUMBER(1) = E(1,3);

99 FRAMERATE(1) = E(1,4);

100 EYELIDOPENING(1) = E(1,5);

101 EYELIDOPENINGQ(1) = E(1,6);

102 PUPILDIAMETER(1) = E(1,7);

103 PUPILDIAMETERQ(1) = E(1,8);

104 FILTEREDPUPILDIAMETER(1) = E(1,9);

105 FILTEREDPUPILDIAMETERQ(1) = E(1,10);

106 ECG(1) = F(1,2);

107 HR(1) = HRV(1,2);

108 HrvHf(1) = HRV(1,3);

109 HrvLf(1) = HRV(1,4);

110 HrvLfHf(1) = HRV(1,5);

111 HrvPnn50(1) = HRV(1,6);

112 HrvRmssd(1) = HRV(1,7);

113 HrvSd1(1) = HRV(1,8);

114 HrvSd2(1) = HRV(1,9);

115 HrvSd2Sd1(1) = HRV(1,10);

116 HrvSdnn(1) = HRV(1,11);

117 HrvSdsd(1) = HRV(1,12);

118

119 *%transform SmartEye placeholder INTERPOLATION*

120 fprintf('merging SmartEye File ...\n');

121 **for** j = 2:x

122 START = min(find(TIME1 > TIMELINE(j-1))); *%find smallest element in*

*TIME1 larger TIMELINE(j-1)*

123 END = max(find(TIME1 <= TIMELINE(j))); *%find largest element in TIME1 smaller than TIMELINE(j)*

124 **if** END >= START

125 TIMESTAMP(j) = mean(E(START:END,2));

126 FRAMENUMBER(j) = mean(E(START:END,3));

127 FRAMERATE(j) = mean(E(START:END,4));

128 EYELIDOPENING(j) = mean(E(START:END,5));

129 EYELIDOPENINGQ(j) = mean(E(START:END,6));

130 PUPILDIAMETER(j) = mean(E(START:END,7));

131 PUPILDIAMETERQ(j) = mean(E(START:END,8));

132 FILTEREDPUPILDIAMETER(j) = mean(E(START:END,9));

133 FILTEREDPUPILDIAMETERQ(j) = mean(E(START:END,10));

134 **else** *%if END < START and no values to be averaged, fill up with prior value*

135 TIMESTAMP(j) = TIMESTAMP(j-1);

136 FRAMENUMBER(j) = FRAMENUMBER(j-1);

137 FRAMERATE(j) = FRAMERATE(j-1);

138 EYELIDOPENING(j) = EYELIDOPENING(j-1);

139 EYELIDOPENINGQ(j) = EYELIDOPENINGQ(j-1);

140 PUPILDIAMETER(j) = PUPILDIAMETER(j-1);

141 PUPILDIAMETERQ(j) = PUPILDIAMETERQ(j-1);

142 FILTEREDPUPILDIAMETER(j) = FILTEREDPUPILDIAMETER(j-1);

143 FILTEREDPUPILDIAMETERQ(j) = FILTEREDPUPILDIAMETERQ(j-1);

144 **end**

145 **end**

146

147 *%transform MovisensAnalyzer placeholder INTERPOLATION*

148 fprintf('merging Hrv File ...\n');

149 **for** l = 2:x

150 START = min(find(TIME3 > TIMELINE(l-1))); *%find smallest element in*

*TIME1 larger TIMELINE(j-1)*

151 END = max(find(TIME3 <= TIMELINE(l))); *%find largest element in TIME1 smaller than TIMELINE(j)*

152 **if** END >= START

153 HR(l) = mean(HRV(START:END,2));

154 HrvHf(l) = mean(HRV(START:END,3));

155 HrvLf(l) = mean(HRV(START:END,4));

156 HrvLfHf(l) = mean(HRV(START:END,5));

157 HrvPnn50(l) = mean(HRV(START:END,6));

158 HrvRmssd(l) = mean(HRV(START:END,7));

159 HrvSd1(l) = mean(HRV(START:END,8));

160 HrvSd2(l) = mean(HRV(START:END,9));

161 HrvSd2Sd1(l) = mean(HRV(START:END,10));

162 HrvSdnn(l) = mean(HRV(START:END,11));

163 HrvSdsd(l) = mean(HRV(START:END,12));

164 **else** *%if END < START and no values to be averaged, fill up with prior value*

165 HR(l) = HR(l-1);

166 HrvHf(l) = HrvHf(l-1);

167 HrvLf(l) = HrvLf(l-1);

168 HrvLfHf(l) = HrvLfHf(l-1);

169 HrvPnn50(l) = HrvPnn50(l-1);

170 HrvRmssd(l) = HrvRmssd(l-1);

171 HrvSd1(l) = HrvSd1(l-1);

172 HrvSd2(l) = HrvSd2(l-1);

173 HrvSd2Sd1(l) = HrvSd2Sd1(l-1);

174 HrvSdnn(l) = HrvSdnn(l-1);

175 HrvSdsd(l) = HrvSdsd(l-1);

176 **end**

177 **end**

178

179 *%transform Movisens placeholder DECIMATION, DOWNSAMPLING*

180 fprintf('merging Movisens File ...\n')

181 START = 1;

182 **for** k = 2:x

183 **if** START+100 > size(TIME2)

184 TIME = TIME2(START:end); *%TIME2 too long, trim to search in first*

*20 elements*

185 vec = (TIME <= TIMELINE(k)); *%find elements in TIME smaller/equal*

*TIMELINE(k)in binary*

186 index = transpose((1:length(vec)));

187 c = vec.\*index; *%translate binary to array index*

188 END = max(c); *%find largest element/index*

189 END = END + START; *%shift index from interval TIME to array TIME2*

190 ECG(k) = mean(F(START:END,2)); *%average all elements between START*

*and END in row 2 (ECG)*

191 START = END; *%START(k+1) = END(k) for next iteration*

192 **else**

193 TIME = TIME2(START:START+100); *%TIME2 too long, trim to search in first 20 elements*

194 vec = (TIME <= TIMELINE(k)); *%find elements in TIME smaller/equal*

*TIMELINE(k)in binary*

195 index = transpose((1:length(vec)));

196 c = vec.\*index; *%translate binary to array index*

197 END = max(c); *%find largest element/index*

198 END = END + START; *%shift index from interval TIME to array TIME2*

199 ECG(k) = mean(F(START:END,2)); *%average all elements between START*

*and END in row 2 (ECG)*

200 START = END; *%START(k+1) = END(k) for next iteration*

201 **end**

202 **end**

203

204 *%merge Movisens and SmartEye*

205 I = horzcat(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);

206

207 *%write to csv*

208 fprintf('Writing file...\n');

209 CSVfile = strcat('F:\Processed\Merged\',name(1:5),'\_merged','.csv'); *%where to store the outputs...*

210 dlmwrite(CSVfile, I,'precision','%10.5f'); *%missing header*

211 fprintf('Done!\n');

212

213 *%elapsed time in loop*

214 toc

215 **end**

216 fprintf('Data Merging completed!');

217 *%clear variables after block*

218

1 *%---------------------------------------------------------*

2 *%Splitting Files for*

3 *%MultiModalBioSignalAnalysis MMBSA*

4 *%Bachelor Thesis Guillermo Hidalgo Gadea*

5 *%Fatigue detection based on multimodal biosignal analysis*

6 *%---------------------------------------------------------*

7

8 *%% load Metadata for StartDriving and Microsleep*

9 clc;

10 fprintf('Loading MetaData \n');

11 FILENAME = 'F:\Recordings\MetaData\MetaData.xlsx';

12 DELIMITER = '\t';

13 [num, txt, raw] = xlsread(FILENAME);

14 METADATA = raw;

15 SUBJECTS = raw(:,1);

16

17 *%% load merged Data*

18 PATH = 'F:\Processed\Merged\';

19

20 *%search directory for subjects*

21 files = dir('F:\Processed\Merged\\*.csv');

22 files = strvcat(files.name);

23 x = size(files);

24 **for** i = 1:x(1)

25 *%start timer*

26 tic

27

28 *%read .csv file*

29 FILE = [PATH files(i,:)];

30 [a,name,b] = fileparts(FILE);

31 fprintf('Loading File ...\n');

32 fprintf('Filename: %s', name);

33 fprintf('\n');

34 J = dlmread(FILE);

35 TIME = J(:,1);

36

37 *%find Microsleep from MetaData*

38 fprintf('Calculating Microsleep ...\n');

39 SUBJECT = strcmp(name(1:5), SUBJECTS); *%search subject name in MetaData*

40 SUBJECTROW = find(SUBJECT == 1); *%find row number in binary logical array*

41 STARTMICROSLEEP = num(SUBJECTROW-1,3); *% -1 shift in row and -2 shift in column between num and raw*

42 ENDMICROSLEEP = num(SUBJECTROW-1,4);

43 START = max(find(TIME <= STARTMICROSLEEP)); *%array index, not time*

44 END = max(find(TIME <= ENDMICROSLEEP));

45

46 *%Define Intervals*

47 INTERVAL = 10; *%set Interval lenght in seconds*

48 INTERVALLENGHT = INTERVAL \* 100; *%100Hz Framerate*

49 MICROSLEEPTIME = END - START; *%mean = 2, max = 6*

50 *%Microsleep interval of lenght INTERVAL with equal add-ons befor*

*STARTMICROSLEEP and after ENDMICROSLEEP*

51 ADDON = (INTERVALLENGHT - MICROSLEEPTIME)/2;

52 START = START - ADDON;

53 END = END + ADDON;

54 fprintf('Splitting Intervals ...\n');

55 *%get Microsleep INterval*

56 K = J(START:END,:);

57

58 *%write to csv*

59 CSVfile = strcat('F:\Processed\Splitted\',name(1:5),'\_splitted\_MS','.csv');

60 dlmwrite(CSVfile, K,'precision','%10.5f'); *%missing header*

61

62 *%splitt file in non MS Intervals*

63 x = fix(START / INTERVALLENGHT); *%integer amount of non MS intervals before*

*MS interval; few first elements at very beginning of recording may be lost...*

64 set = 1;

65 **for** i = 1:x

66 K = J(START-INTERVALLENGHT:START,:);

67 START = START - INTERVALLENGHT;

68 set = num2str(set);

69 CSVfile = strcat('F:\Processed\Splitted\',name(1:5),'\_splitted\_',set

,'\_beforeMS','.csv');

70 dlmwrite(CSVfile, K,'precision','%10.5f'); *%missing header*

71 set = str2num(set);

72 set = set + 1;

73 **end**

74

75 fprintf('Done!\n');

76 *%elapsed time in loop*

77 toc

78

79 **end**

80 fprintf('Data Splitting completed!');

81

1 *%---------------------------------------------------------*

2 *%Feature extraction for*

3 *%MultiModalBioSignalAnalysis MMBSA*

4 *%Bachelor Thesis Guillermo Hidalgo Gadea*

5 *%Fatigue detection based on multimodal biosignal analysis*

6 *%---------------------------------------------------------*

7

8 *%% load Data for Microsleep interval*

9 fprintf('Loading Microsleep data...\n');

10 PATH = 'F:\Processed\Splitted\';

11

12 *% search directory for subjects*

13 files = dir('F:\Processed\Splitted\\*\_MS.csv');

14 files = strvcat(files.name);

15 x = size(files);

16

17 *% placeholder feature Table*

18 FeatureTableMS = ones(x(1),96);

19

20 **for** i = 1:x(1)

21

22 *%read .csv file*

23 FILE = [PATH files(i,:)];

24 [a,name,b] = fileparts(FILE);

25 fprintf('loading File ...\n');

26 fprintf('Filename: %s', name);

27 fprintf('\n');

28 J = dlmread(FILE);

29

30 *%calculate features*

31 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

32

33 *% average*

34 FeatureTableMS(i,1) = mean(J(:,2)); *%ECG*

35 FeatureTableMS(i,2) = mean(J(:,3)); *%HR*

36 FeatureTableMS(i,3) = mean(J(:,4)); *%HrvHf*

37 FeatureTableMS(i,4) = mean(J(:,5)); *%HrvLf*

38 FeatureTableMS(i,5) = mean(J(:,6)); *%HrvLfHf*

39 FeatureTableMS(i,6) = mean(J(:,7)); *%HrvPnn50*

40 FeatureTableMS(i,7) = mean(J(:,8)); *%HrvRmssd*

41 FeatureTableMS(i,8) = mean(J(:,9)); *%HrvSd1*

42 FeatureTableMS(i,9) = mean(J(:,10)); *%HrvSd2*

43 FeatureTableMS(i,10) = mean(J(:,11)); *%HrvSd2Sd1*

44 FeatureTableMS(i,11) = mean(J(:,12)); *%HrvSdnn*

45 FeatureTableMS(i,12) = mean(J(:,13)); *%HrvSdsd*

46 FeatureTableMS(i,13) = mean(J(:,17)); *%EYELIDOPENING*

47 FeatureTableMS(i,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

48

49 *% variance*

50 FeatureTableMS(i,15) = var(J(:,2)); *%ECG*

51 FeatureTableMS(i,16) = var(J(:,17)); *%EYELIDOPENING*

52 FeatureTableMS(i,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

53

54 *% brute force feature extraction*

55 *% means of derivates*

56 FeatureTableMS(i,18) = mean(diff(J(:,2))); *% dECG*

57 FeatureTableMS(i,19) = mean(diff(J(:,2),2)); *% d2ECG*

58 FeatureTableMS(i,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

59 FeatureTableMS(i,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

60 FeatureTableMS(i,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

61 FeatureTableMS(i,23) = mean(diff(J(:,21),2)); *%*

*d2FILTEREDPUPILDIAMETER*

62

63 *% skewness of derivates*

64 FeatureTableMS(i,24) = skewness(diff(J(:,2))); *% dECG*

65 FeatureTableMS(i,25) = skewness(diff(J(:,2),2)); *% d2ECG*

66 FeatureTableMS(i,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

67 FeatureTableMS(i,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

68 FeatureTableMS(i,28) = skewness(diff(J(:,21))); *%*

*dFILTEREDPUPILDIAMETER*

69 FeatureTableMS(i,29) = skewness(diff(J(:,21),2)); *%*

*d2FILTEREDPUPILDIAMETER*

70

71 *% kurtosis of derivates*

72 FeatureTableMS(i,30) = kurtosis(diff(J(:,2))); *% dECG*

73 FeatureTableMS(i,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

74 FeatureTableMS(i,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

75 FeatureTableMS(i,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

76 FeatureTableMS(i,34) = kurtosis(diff(J(:,21))); *%*

*dFILTEREDPUPILDIAMETER*

77 FeatureTableMS(i,35) = kurtosis(diff(J(:,21),2)); *%*

*d2FILTEREDPUPILDIAMETER*

78

79 *% min of derivates*

80 FeatureTableMS(i,36) = min(diff(J(:,2))); *% dECG*

81 FeatureTableMS(i,37) = min(diff(J(:,2),2)); *% d2ECG*

82 FeatureTableMS(i,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

83 FeatureTableMS(i,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

84 FeatureTableMS(i,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

85 FeatureTableMS(i,41) = min(diff(J(:,21),2)); *%*

*d2FILTEREDPUPILDIAMETER*

86

87 *% max of derivates*

88 FeatureTableMS(i,42) = max(diff(J(:,2))); *% dECG*

89 FeatureTableMS(i,43) = max(diff(J(:,2),2)); *% d2ECG*

90 FeatureTableMS(i,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

91 FeatureTableMS(i,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

92 FeatureTableMS(i,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

93 FeatureTableMS(i,47) = max(diff(J(:,21),2)); *%*

*d2FILTEREDPUPILDIAMETER*

94

95 *% means of periodogram power spectral density*

96 FeatureTableMS(i,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

97 FeatureTableMS(i,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

98 FeatureTableMS(i,50) = mean(periodogram(diff(J(:,17)))); *%*

*dEYELIDOPENING*

99 FeatureTableMS(i,51) = mean(periodogram(diff(J(:,17),2))); *%*

*d2EYELIDOPENING*

100 FeatureTableMS(i,52) = mean(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

101 FeatureTableMS(i,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

102

103 *% skewness of periodogram power spectral density*

104 FeatureTableMS(i,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

105 FeatureTableMS(i,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

106 FeatureTableMS(i,56) = skewness(periodogram(diff(J(:,17)))); *%*

*dEYELIDOPENING*

107 FeatureTableMS(i,57) = skewness(periodogram(diff(J(:,17),2))); *%*

*d2EYELIDOPENING*

108 FeatureTableMS(i,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

109 FeatureTableMS(i,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

110

111 *% kurtosis of periodogram power spectral density*

112 FeatureTableMS(i,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

113 FeatureTableMS(i,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

114 FeatureTableMS(i,62) = kurtosis(periodogram(diff(J(:,17)))); *%*

*dEYELIDOPENING*

115 FeatureTableMS(i,63) = kurtosis(periodogram(diff(J(:,17),2))); *%*

*d2EYELIDOPENING*

116 FeatureTableMS(i,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

117 FeatureTableMS(i,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

118

119 *% min of periodogram power spectral density*

120 FeatureTableMS(i,66) = min(periodogram(diff(J(:,2)))); *% dECG*

121 FeatureTableMS(i,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

122 FeatureTableMS(i,68) = min(periodogram(diff(J(:,17)))); *%*

*dEYELIDOPENING*

123 FeatureTableMS(i,69) = min(periodogram(diff(J(:,17),2))); *%*

*d2EYELIDOPENING*

124 FeatureTableMS(i,70) = min(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

125 FeatureTableMS(i,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

126

127 *% max of periodogram power spectral density*

128 FeatureTableMS(i,72) = max(periodogram(diff(J(:,2)))); *% dECG*

129 FeatureTableMS(i,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

130 FeatureTableMS(i,74) = max(periodogram(diff(J(:,17)))); *%*

*dEYELIDOPENING*

131 FeatureTableMS(i,75) = max(periodogram(diff(J(:,17),2))); *%*

*d2EYELIDOPENING*

132 FeatureTableMS(i,76) = max(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

133 FeatureTableMS(i,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

134

135 *% 5 percentile of derivates*

136 FeatureTableMS(i,78) = prctile(diff(J(:,2)),5); *% dECG*

137 FeatureTableMS(i,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

138 FeatureTableMS(i,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

139 FeatureTableMS(i,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

140 FeatureTableMS(i,82) = prctile(diff(J(:,21)),5); *%*

*dFILTEREDPUPILDIAMETER*

141 FeatureTableMS(i,83) = prctile(diff(J(:,21),2),5); *%*

*d2FILTEREDPUPILDIAMETER*

142

143 *% 25 percentile of derivates*

144 FeatureTableMS(i,84) = prctile(diff(J(:,2)),25); *% dECG*

145 FeatureTableMS(i,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

146 FeatureTableMS(i,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

147 FeatureTableMS(i,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

148 FeatureTableMS(i,88) = prctile(diff(J(:,21)),25); *%*

*dFILTEREDPUPILDIAMETER*

149 FeatureTableMS(i,89) = prctile(diff(J(:,21),2),25); *%*

*d2FILTEREDPUPILDIAMETER*

150

151 *% 75 percentile of derivates*

152 FeatureTableMS(i,90) = prctile(diff(J(:,2)),75); *% dECG*

153 FeatureTableMS(i,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

154 FeatureTableMS(i,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

155 FeatureTableMS(i,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

156 FeatureTableMS(i,94) = prctile(diff(J(:,21)),75); *%*

*dFILTEREDPUPILDIAMETER*

157 FeatureTableMS(i,95) = prctile(diff(J(:,21),2),75); *%*

*d2FILTEREDPUPILDIAMETER*

158

159 *% 95 percentile of derivates*

160 FeatureTableMS(i,96) = prctile(diff(J(:,2)),95); *% dECG*

161 FeatureTableMS(i,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

162 FeatureTableMS(i,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

163 FeatureTableMS(i,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

164 FeatureTableMS(i,100) = prctile(diff(J(:,21)),95); *%*

*dFILTEREDPUPILDIAMETER*

165 FeatureTableMS(i,101) = prctile(diff(J(:,21),2),95); *%*

*d2FILTEREDPUPILDIAMETER*

166

167 *% label*

168 FeatureTableMS(i,102) = 1;

169

170 **end**

171

172 FeatureTable = FeatureTableMS;

173

174 *%% load Data for non Microsleep interval*

175 fprintf('Loading non Microsleep data...\n');

176 PATH = 'F:\Processed\Splitted\';

177

178 *% subjects had different time to microsleep and therefore different*

179 *% driving times, resulting in different amount of intervals before MS.*

180 *% To standarize the reference non microsleep intervals, the smallest*

181 *% needs to be considered (vp029 with 48 intervals)*

182 *% Two intervals per subject are selected after 5min driving = mex - 30*

183 *% and max - 31. The maximal intervals are listed below*

184

185 *% 'vp003\_splitted\_264\_beforeMS.csv' --> 234, 233*

186 *% 'vp008\_splitted\_435\_beforeMS.csv' --> 405, 404*

187 *% 'vp017\_splitted\_256\_beforeMS.csv' --> 226, 225*

188 *% 'vp020\_splitted\_333\_beforeMS.csv' --> 303, 302*

189 *% 'vp023\_splitted\_331\_beforeMS.csv' --> 301, 300*

190 *% 'vp024\_splitted\_484\_beforeMS.csv' --> 454, 453*

191 *% 'vp028\_splitted\_762\_beforeMS.csv' --> 732, 731*

192 *% 'vp029\_splitted\_48\_beforeMS.csv' --> 18, 17*

193 *% 'vp030\_splitted\_314\_beforeMS.csv' --> 286, 285*

194 *% 'vp031\_splitted\_123\_beforeMS.csv' --> 93, 92*

195 *% 'vp032\_splitted\_237\_beforeMS.csv' --> 207, 206*

196

197

198 *% vp003\_234*

199 file = 'F:\Processed\Splitted\vp003\_splitted\_234\_beforeMS.csv';

200

201 F = ones(1,102); *%adapt size to number of features + label*

202

203 *% read .csv file*

204 fprintf('loading File ...\n');

205 fprintf('Filename: %s', file(23:40));

206 fprintf('\n');

207 J = dlmread(file);

208

209 *% calculate features*

210 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

211

212 *% average*

213 F(1,1) = mean(J(:,2)); *%ECG*

214 F(1,2) = mean(J(:,3)); *%HR*

215 F(1,3) = mean(J(:,4)); *%HrvHf*

216 F(1,4) = mean(J(:,5)); *%HrvLf*

217 F(1,5) = mean(J(:,6)); *%HrvLfHf*

218 F(1,6) = mean(J(:,7)); *%HrvPnn50*

219 F(1,7) = mean(J(:,8)); *%HrvRmssd*

220 F(1,8) = mean(J(:,9)); *%HrvSd1*

221 F(1,9) = mean(J(:,10)); *%HrvSd2*

222 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

223 F(1,11) = mean(J(:,12)); *%HrvSdnn*

224 F(1,12) = mean(J(:,13)); *%HrvSdsd*

225 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

226 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

227

228 *% variance*

229 F(1,15) = var(J(:,2)); *%ECG*

230 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

231 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

232

233 *% brute force feature extraction*

234 *% means of derivates*

235 F(1,18) = mean(diff(J(:,2))); *% dECG*

236 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

237 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

238 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

239 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

240 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

241

242 *% skewness of derivates*

243 F(1,24) = skewness(diff(J(:,2))); *% dECG*

244 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

245 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

246 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

247 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

248 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

249

250 *% kurtosis of derivates*

251 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

252 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

253 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

254 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

255 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

256 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

257

258 *% min of derivates*

259 F(1,36) = min(diff(J(:,2))); *% dECG*

260 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

261 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

262 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

263 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

264 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

265

266 *% max of derivates*

267 F(1,42) = max(diff(J(:,2))); *% dECG*

268 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

269 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

270 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

271 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

272 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

273

274 *% means of periodogram power spectral density*

275 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

276 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

277 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

278 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

279 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

280 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

281

282 *% skewness of periodogram power spectral density*

283 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

284 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

285 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

286 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

287 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

288 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

289

290 *% kurtosis of periodogram power spectral density*

291 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

292 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

293 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

294 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

295 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

296 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

297

298 *% min of periodogram power spectral density*

299 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

300 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

301 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

302 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

303 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

304 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

305

306 *% max of periodogram power spectral density*

307 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

308 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

309 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

310 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

311 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

312 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

313

314 *% 5 percentile of derivates*

315 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

316 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

317 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

318 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

319 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

320 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

321

322 *% 25 percentile of derivates*

323 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

324 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

325 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

326 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

327 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

328 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

329

330 *% 75 percentile of derivates*

331 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

332 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

333 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

334 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

335 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

336 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

337

338 *% 95 percentile of derivates*

339 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

340 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

341 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

342 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

343 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

344 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

345

346

347 *% label*

348 F(1,102) = 0;

349

350 FeatureTable = vertcat(FeatureTable, F);

351

352

353 *% vp003\_233*

354 file = 'F:\Processed\Splitted\vp003\_splitted\_233\_beforeMS.csv';

355

356 *% read .csv file*

357 fprintf('loading File ...\n');

358 fprintf('Filename: %s', file(23:40));

359 fprintf('\n');

360 J = dlmread(file);

361

362 *% calculate features*

363 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

364

365 *% average*

366 F(1,1) = mean(J(:,2)); *%ECG*

367 F(1,2) = mean(J(:,3)); *%HR*

368 F(1,3) = mean(J(:,4)); *%HrvHf*

369 F(1,4) = mean(J(:,5)); *%HrvLf*

370 F(1,5) = mean(J(:,6)); *%HrvLfHf*

371 F(1,6) = mean(J(:,7)); *%HrvPnn50*

372 F(1,7) = mean(J(:,8)); *%HrvRmssd*

373 F(1,8) = mean(J(:,9)); *%HrvSd1*

374 F(1,9) = mean(J(:,10)); *%HrvSd2*

375 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

376 F(1,11) = mean(J(:,12)); *%HrvSdnn*

377 F(1,12) = mean(J(:,13)); *%HrvSdsd*

378 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

379 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

380

381 *% variance*

382 F(1,15) = var(J(:,2)); *%ECG*

383 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

384 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

385

386 *% brute force feature extraction*

387 *% means of derivates*

388 F(1,18) = mean(diff(J(:,2))); *% dECG*

389 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

390 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

391 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

392 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

393 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

394

395 *% skewness of derivates*

396 F(1,24) = skewness(diff(J(:,2))); *% dECG*

397 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

398 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

399 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

400 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

401 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

402

403 *% kurtosis of derivates*

404 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

405 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

406 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

407 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

408 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

409 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

410

411 *% min of derivates*

412 F(1,36) = min(diff(J(:,2))); *% dECG*

413 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

414 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

415 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

416 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

417 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

418

419 *% max of derivates*

420 F(1,42) = max(diff(J(:,2))); *% dECG*

421 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

422 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

423 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

424 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

425 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

426

427 *% means of periodogram power spectral density*

428 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

429 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

430 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

431 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

432 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

433 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

434

435 *% skewness of periodogram power spectral density*

436 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

437 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

438 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

439 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

440 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

441 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

442

443 *% kurtosis of periodogram power spectral density*

444 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

445 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

446 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

447 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

448 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

449 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

450

451 *% min of periodogram power spectral density*

452 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

453 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

454 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

455 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

456 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

457 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

458

459 *% max of periodogram power spectral density*

460 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

461 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

462 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

463 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

464 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

465 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

466

467 *% 5 percentile of derivates*

468 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

469 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

470 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

471 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

472 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

473 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

474

475 *% 25 percentile of derivates*

476 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

477 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

478 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

479 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

480 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

481 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

482

483 *% 75 percentile of derivates*

484 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

485 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

486 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

487 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

488 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

489 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

490

491 *% 95 percentile of derivates*

492 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

493 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

494 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

495 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

496 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

497 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

498

499

500 *% label*

501 F(1,102) = 0;

502

503 FeatureTable = vertcat(FeatureTable, F);

504

505

506 *% vp008\_405*

507 file = 'F:\Processed\Splitted\vp008\_splitted\_405\_beforeMS.csv';

508

509 *% read .csv file*

510 fprintf('loading File ...\n');

511 fprintf('Filename: %s', file(23:40));

512 fprintf('\n');

513 J = dlmread(file);

514

515 *% calculate features*

516 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

517

518 *% average*

519 F(1,1) = mean(J(:,2)); *%ECG*

520 F(1,2) = mean(J(:,3)); *%HR*

521 F(1,3) = mean(J(:,4)); *%HrvHf*

522 F(1,4) = mean(J(:,5)); *%HrvLf*

523 F(1,5) = mean(J(:,6)); *%HrvLfHf*

524 F(1,6) = mean(J(:,7)); *%HrvPnn50*

525 F(1,7) = mean(J(:,8)); *%HrvRmssd*

526 F(1,8) = mean(J(:,9)); *%HrvSd1*

527 F(1,9) = mean(J(:,10)); *%HrvSd2*

528 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

529 F(1,11) = mean(J(:,12)); *%HrvSdnn*

530 F(1,12) = mean(J(:,13)); *%HrvSdsd*

531 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

532 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

533

534 *% variance*

535 F(1,15) = var(J(:,2)); *%ECG*

536 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

537 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

538

539 *% brute force feature extraction*

540 *% means of derivates*

541 F(1,18) = mean(diff(J(:,2))); *% dECG*

542 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

543 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

544 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

545 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

546 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

547

548 *% skewness of derivates*

549 F(1,24) = skewness(diff(J(:,2))); *% dECG*

550 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

551 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

552 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

553 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

554 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

555

556 *% kurtosis of derivates*

557 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

558 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

559 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

560 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

561 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

562 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

563

564 *% min of derivates*

565 F(1,36) = min(diff(J(:,2))); *% dECG*

566 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

567 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

568 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

569 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

570 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

571

572 *% max of derivates*

573 F(1,42) = max(diff(J(:,2))); *% dECG*

574 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

575 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

576 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

577 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

578 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

579

580 *% means of periodogram power spectral density*

581 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

582 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

583 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

584 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

585 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

586 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

587

588 *% skewness of periodogram power spectral density*

589 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

590 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

591 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

592 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

593 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

594 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

595

596 *% kurtosis of periodogram power spectral density*

597 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

598 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

599 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

600 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

601 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

602 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

603

604 *% min of periodogram power spectral density*

605 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

606 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

607 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

608 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

609 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

610 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

611

612 *% max of periodogram power spectral density*

613 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

614 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

615 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

616 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

617 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

618 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

619

620 *% 5 percentile of derivates*

621 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

622 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

623 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

624 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

625 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

626 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

627

628 *% 25 percentile of derivates*

629 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

630 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

631 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

632 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

633 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

634 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

635

636 *% 75 percentile of derivates*

637 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

638 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

639 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

640 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

641 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

642 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

643

644 *% 95 percentile of derivates*

645 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

646 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

647 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

648 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

649 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

650 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

651

652

|  |  |  |
| --- | --- | --- |
| 653 |  | *% label* |
| 654 |  | F(1,102) = 0; |
| 655 |  |  |
| 656 |  | FeatureTable = vertcat(FeatureTable, F); |
| 657 |  |  |
| 658 |  |  |
| 659 | *%* | *vp008\_404* |
| 660 |  | file = 'F:\Processed\Splitted\vp008\_splitted\_404\_beforeMS.csv'; |
| 661 |  |  |
| 662 |  | *% read .csv file* |
| 663 |  | fprintf('loading File ...\n'); |
| 664 |  | fprintf('Filename: %s', file(23:40)); |
| 665 |  | fprintf('\n'); |
| 666 |  | J = dlmread(file); |
| 667 |  |  |
| 668 |  | *% calculate features* |
| 669 |  | *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd,* |

*HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE,*

*EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

670

671 *% average*

672 F(1,1) = mean(J(:,2)); *%ECG*

673 F(1,2) = mean(J(:,3)); *%HR*

674 F(1,3) = mean(J(:,4)); *%HrvHf*

675 F(1,4) = mean(J(:,5)); *%HrvLf*

676 F(1,5) = mean(J(:,6)); *%HrvLfHf*

677 F(1,6) = mean(J(:,7)); *%HrvPnn50*

678 F(1,7) = mean(J(:,8)); *%HrvRmssd*

679 F(1,8) = mean(J(:,9)); *%HrvSd1*

680 F(1,9) = mean(J(:,10)); *%HrvSd2*

681 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

682 F(1,11) = mean(J(:,12)); *%HrvSdnn*

683 F(1,12) = mean(J(:,13)); *%HrvSdsd*

684 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

685 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

686

687 *% variance*

688 F(1,15) = var(J(:,2)); *%ECG*

689 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

690 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

691

692 *% brute force feature extraction*

693 *% means of derivates*

694 F(1,18) = mean(diff(J(:,2))); *% dECG*

695 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

696 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

697 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

698 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

699 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

700

701 *% skewness of derivates*

702 F(1,24) = skewness(diff(J(:,2))); *% dECG*

703 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

704 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

705 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

706 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

707 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

708

709 *% kurtosis of derivates*

710 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

711 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

712 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

713 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

714 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

715 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

716

717 *% min of derivates*

718 F(1,36) = min(diff(J(:,2))); *% dECG*

719 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

720 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

721 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

722 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

723 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

724

725 *% max of derivates*

726 F(1,42) = max(diff(J(:,2))); *% dECG*

727 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

728 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

729 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

730 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

731 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

732

733 *% means of periodogram power spectral density*

734 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

735 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

736 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

737 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

738 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

739 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

740

741 *% skewness of periodogram power spectral density*

742 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

743 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

744 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

745 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

746 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

747 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

748

749 *% kurtosis of periodogram power spectral density*

750 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

751 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

752 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

753 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

754 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

755 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

756

757 *% min of periodogram power spectral density*

758 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

759 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

760 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

761 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

762 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

763 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

764

765 *% max of periodogram power spectral density*

766 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

767 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

768 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

769 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

770 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

771 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

772

773 *% 5 percentile of derivates*

774 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

775 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

776 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

777 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

778 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

779 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

780

781 *% 25 percentile of derivates*

782 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

783 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

784 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

785 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

786 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

787 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

788

789 *% 75 percentile of derivates*

790 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

791 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

792 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

793 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

794 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

795 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

796

797 *% 95 percentile of derivates*

798 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

799 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

800 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

801 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

802 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

803 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

804

805

806 *% label*

807 F(1,102) = 0;

808

809 FeatureTable = vertcat(FeatureTable, F);

810

811

812 *% vp017\_226*

813 file = 'F:\Processed\Splitted\vp017\_splitted\_226\_beforeMS.csv';

814

815 *% read .csv file*

816 fprintf('loading File ...\n');

817 fprintf('Filename: %s', file(23:40));

818 fprintf('\n');

819 J = dlmread(file);

820

821 *% calculate features*

822 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd,*

*HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

823

824 *% average*

825 F(1,1) = mean(J(:,2)); *%ECG*

826 F(1,2) = mean(J(:,3)); *%HR*

827 F(1,3) = mean(J(:,4)); *%HrvHf*

828 F(1,4) = mean(J(:,5)); *%HrvLf*

829 F(1,5) = mean(J(:,6)); *%HrvLfHf*

830 F(1,6) = mean(J(:,7)); *%HrvPnn50*

831 F(1,7) = mean(J(:,8)); *%HrvRmssd*

832 F(1,8) = mean(J(:,9)); *%HrvSd1*

833 F(1,9) = mean(J(:,10)); *%HrvSd2*

834 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

835 F(1,11) = mean(J(:,12)); *%HrvSdnn*

836 F(1,12) = mean(J(:,13)); *%HrvSdsd*

837 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

838 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

839

840 *% variance*

841 F(1,15) = var(J(:,2)); *%ECG*

842 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

843 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

844

845 *% brute force feature extraction*

846 *% means of derivates*

847 F(1,18) = mean(diff(J(:,2))); *% dECG*

848 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

849 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

850 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

851 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

852 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

853

854 *% skewness of derivates*

855 F(1,24) = skewness(diff(J(:,2))); *% dECG*

856 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

857 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

858 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

859 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

860 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

861

862 *% kurtosis of derivates*

863 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

864 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

865 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

866 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

867 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

868 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

869

870 *% min of derivates*

871 F(1,36) = min(diff(J(:,2))); *% dECG*

872 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

873 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

874 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

875 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

876 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

877

878 *% max of derivates*

879 F(1,42) = max(diff(J(:,2))); *% dECG*

880 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

881 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

882 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

883 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

884 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

885

886 *% means of periodogram power spectral density*

887 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

888 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

889 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

890 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

891 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

892 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

893

894 *% skewness of periodogram power spectral density*

895 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

896 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

897 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

898 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

899 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

900 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

901

902 *% kurtosis of periodogram power spectral density*

903 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

904 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

905 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

906 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

907 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

908 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

909

910 *% min of periodogram power spectral density*

911 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

912 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

913 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

914 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

915 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

916 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

917

918 *% max of periodogram power spectral density*

919 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

920 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

921 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

922 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

923 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

924 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

925

926 *% 5 percentile of derivates*

927 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

928 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

929 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

930 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

931 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

932 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

933

934 *% 25 percentile of derivates*

935 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

936 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

937 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

938 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

939 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

940 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

941

942 *% 75 percentile of derivates*

943 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

944 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

945 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

946 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

947 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

948 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

949

950 *% 95 percentile of derivates*

951 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

952 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

953 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

954 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

955 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

956 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

957

958

959 *% label*

960 F(1,102) = 0;

961

962 FeatureTable = vertcat(FeatureTable, F);

963

964

965 *% vp017\_225*

966 file = 'F:\Processed\Splitted\vp017\_splitted\_225\_beforeMS.csv';

967

968 *% read .csv file*

969 fprintf('loading File ...\n');

970 fprintf('Filename: %s', file(23:40));

971 fprintf('\n');

972 J = dlmread(file);

973

974 *% calculate features*

975 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

976

977 *% average*

978 F(1,1) = mean(J(:,2)); *%ECG*

979 F(1,2) = mean(J(:,3)); *%HR*

980 F(1,3) = mean(J(:,4)); *%HrvHf*

981 F(1,4) = mean(J(:,5)); *%HrvLf*

982 F(1,5) = mean(J(:,6)); *%HrvLfHf*

983 F(1,6) = mean(J(:,7)); *%HrvPnn50*

984 F(1,7) = mean(J(:,8)); *%HrvRmssd*

985 F(1,8) = mean(J(:,9)); *%HrvSd1*

986 F(1,9) = mean(J(:,10)); *%HrvSd2*

987 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

988 F(1,11) = mean(J(:,12)); *%HrvSdnn*

989 F(1,12) = mean(J(:,13)); *%HrvSdsd*

990 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

991 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

992

993 *% variance*

994 F(1,15) = var(J(:,2)); *%ECG*

995 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

996 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

997

998 *% brute force feature extraction*

999 *% means of derivates*

1000 F(1,18) = mean(diff(J(:,2))); *% dECG*

1001 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1002 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1003 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1004 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1005 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1006

1007 *% skewness of derivates*

1008 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1009 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1010 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1011 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1012 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1013 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1014

1015 *% kurtosis of derivates*

1016 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1017 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1018 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1019 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1020 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1021 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1022

1023 *% min of derivates*

1024 F(1,36) = min(diff(J(:,2))); *% dECG*

1025 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1026 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1027 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1028 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1029 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1030

1031 *% max of derivates*

1032 F(1,42) = max(diff(J(:,2))); *% dECG*

1033 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1034 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1035 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1036 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1037 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1038

1039 *% means of periodogram power spectral density*

1040 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1041 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1042 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1043 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1044 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1045 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1046

1047 *% skewness of periodogram power spectral density*

1048 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1049 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1050 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1051 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1052 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1053 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1054

1055 *% kurtosis of periodogram power spectral density*

1056 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1057 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1058 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1059 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1060 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1061 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1062

1063 *% min of periodogram power spectral density*

1064 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1065 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1066 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1067 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1068 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1069 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1070

1071 *% max of periodogram power spectral density*

1072 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1073 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1074 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1075 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1076 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1077 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1078

1079 *% 5 percentile of derivates*

1080 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1081 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1082 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1083 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1084 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1085 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1086

1087 *% 25 percentile of derivates*

1088 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1089 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1090 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1091 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1092 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1093 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1094

1095 *% 75 percentile of derivates*

1096 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1097 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1098 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1099 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1100 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1101 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1102

1103 *% 95 percentile of derivates*

1104 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1105 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1106 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1107 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1108 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1109 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

1110

1111

1112 *% label*

1113 F(1,102) = 0;

1114

1115 FeatureTable = vertcat(FeatureTable, F);

1116

1117

1118 *% vp020\_303*

1119 file = 'F:\Processed\Splitted\vp020\_splitted\_303\_beforeMS.csv';

1120

1121 *% read .csv file*

1122 fprintf('loading File ...\n');

1123 fprintf('Filename: %s', file(23:40));

1124 fprintf('\n');

1125 J = dlmread(file);

1126

1127 *% calculate features*

1128 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1129

1130 *% average*

1131 F(1,1) = mean(J(:,2)); *%ECG*

1132 F(1,2) = mean(J(:,3)); *%HR*

1133 F(1,3) = mean(J(:,4)); *%HrvHf*

1134 F(1,4) = mean(J(:,5)); *%HrvLf*

1135 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1136 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1137 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1138 F(1,8) = mean(J(:,9)); *%HrvSd1*

1139 F(1,9) = mean(J(:,10)); *%HrvSd2*

1140 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1141 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1142 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1143 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1144 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1145

1146 *% variance*

1147 F(1,15) = var(J(:,2)); *%ECG*

1148 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1149 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1150

1151 *% brute force feature extraction*

1152 *% means of derivates*

1153 F(1,18) = mean(diff(J(:,2))); *% dECG*

1154 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1155 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1156 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1157 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1158 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1159

1160 *% skewness of derivates*

1161 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1162 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1163 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1164 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1165 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1166 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1167

1168 *% kurtosis of derivates*

1169 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1170 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1171 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1172 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1173 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1174 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1175

1176 *% min of derivates*

1177 F(1,36) = min(diff(J(:,2))); *% dECG*

1178 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1179 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1180 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1181 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1182 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1183

1184 *% max of derivates*

1185 F(1,42) = max(diff(J(:,2))); *% dECG*

1186 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1187 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1188 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1189 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1190 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1191

1192 *% means of periodogram power spectral density*

1193 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1194 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1195 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1196 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1197 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1198 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1199

1200 *% skewness of periodogram power spectral density*

1201 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1202 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1203 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1204 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1205 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1206 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1207

1208 *% kurtosis of periodogram power spectral density*

1209 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1210 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1211 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1212 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1213 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1214 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1215

1216 *% min of periodogram power spectral density*

1217 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1218 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1219 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1220 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1221 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1222 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1223

1224 *% max of periodogram power spectral density*

1225 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1226 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1227 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1228 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1229 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1230 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1231

1232 *% 5 percentile of derivates*

1233 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1234 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1235 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1236 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1237 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1238 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1239

1240 *% 25 percentile of derivates*

1241 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1242 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1243 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1244 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1245 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1246 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1247

1248 *% 75 percentile of derivates*

1249 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1250 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1251 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1252 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1253 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1254 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1255

1256 *% 95 percentile of derivates*

1257 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1258 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1259 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1260 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1261 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1262 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

1263

1264

1265 *% label*

1266 F(1,102) = 0;

1267

1268 FeatureTable = vertcat(FeatureTable, F);

1269

1270

1271 *% vp020\_302*

1272 file = 'F:\Processed\Splitted\vp020\_splitted\_302\_beforeMS.csv';

1273

1274 *% read .csv file*

1275 fprintf('loading File ...\n');

1276 fprintf('Filename: %s', file(23:40));

1277 fprintf('\n');

1278 J = dlmread(file);

1279

1280 *% calculate features*

1281 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1282

1283 *% average*

1284 F(1,1) = mean(J(:,2)); *%ECG*

1285 F(1,2) = mean(J(:,3)); *%HR*

1286 F(1,3) = mean(J(:,4)); *%HrvHf*

1287 F(1,4) = mean(J(:,5)); *%HrvLf*

1288 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1289 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1290 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1291 F(1,8) = mean(J(:,9)); *%HrvSd1*

1292 F(1,9) = mean(J(:,10)); *%HrvSd2*

1293 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1294 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1295 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1296 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1297 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1298

1299 *% variance*

1300 F(1,15) = var(J(:,2)); *%ECG*

1301 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1302 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1303

1304 *% brute force feature extraction*

1305 *% means of derivates*

1306 F(1,18) = mean(diff(J(:,2))); *% dECG*

1307 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1308 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1309 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1310 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1311 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1312

1313 *% skewness of derivates*

1314 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1315 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1316 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1317 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1318 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1319 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1320

1321 *% kurtosis of derivates*

1322 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1323 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1324 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1325 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1326 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1327 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1328

1329 *% min of derivates*

1330 F(1,36) = min(diff(J(:,2))); *% dECG*

1331 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1332 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1333 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1334 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1335 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1336

1337 *% max of derivates*

1338 F(1,42) = max(diff(J(:,2))); *% dECG*

1339 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1340 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1341 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1342 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1343 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1344

1345 *% means of periodogram power spectral density*

1346 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1347 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1348 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1349 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1350 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1351 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1352

1353 *% skewness of periodogram power spectral density*

1354 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1355 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1356 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1357 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1358 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1359 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1360

1361 *% kurtosis of periodogram power spectral density*

1362 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1363 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1364 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1365 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1366 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1367 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1368

1369 *% min of periodogram power spectral density*

1370 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1371 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1372 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1373 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1374 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1375 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1376

1377 *% max of periodogram power spectral density*

1378 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1379 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1380 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1381 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1382 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1383 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1384

1385 *% 5 percentile of derivates*

1386 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1387 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1388 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1389 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1390 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1391 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1392

1393 *% 25 percentile of derivates*

1394 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1395 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1396 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1397 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1398 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1399 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1400

1401 *% 75 percentile of derivates*

1402 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1403 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1404 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1405 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1406 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1407 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1408

1409 *% 95 percentile of derivates*

1410 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1411 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1412 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1413 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1414 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1415 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

1416

1417

1418 *% label*

1419 F(1,102) = 0;

1420

1421 FeatureTable = vertcat(FeatureTable, F);

1422

1423

1424 *% vp023\_301*

1425 file = 'F:\Processed\Splitted\vp023\_splitted\_301\_beforeMS.csv';

1426

1427 *% read .csv file*

1428 fprintf('loading File ...\n');

1429 fprintf('Filename: %s', file(23:40));

1430 fprintf('\n');

1431 J = dlmread(file);

1432

1433 *% calculate features*

1434 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1435

1436 *% average*

1437 F(1,1) = mean(J(:,2)); *%ECG*

1438 F(1,2) = mean(J(:,3)); *%HR*

1439 F(1,3) = mean(J(:,4)); *%HrvHf*

1440 F(1,4) = mean(J(:,5)); *%HrvLf*

1441 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1442 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1443 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1444 F(1,8) = mean(J(:,9)); *%HrvSd1*

1445 F(1,9) = mean(J(:,10)); *%HrvSd2*

1446 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1447 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1448 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1449 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1450 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1451

1452 *% variance*

1453 F(1,15) = var(J(:,2)); *%ECG*

1454 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1455 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1456

1457 *% brute force feature extraction*

1458 *% means of derivates*

1459 F(1,18) = mean(diff(J(:,2))); *% dECG*

1460 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1461 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1462 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1463 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1464 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1465

1466 *% skewness of derivates*

1467 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1468 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1469 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1470 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1471 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1472 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1473

1474 *% kurtosis of derivates*

1475 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1476 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1477 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1478 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1479 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1480 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1481

1482 *% min of derivates*

1483 F(1,36) = min(diff(J(:,2))); *% dECG*

1484 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1485 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1486 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1487 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1488 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1489

1490 *% max of derivates*

1491 F(1,42) = max(diff(J(:,2))); *% dECG*

1492 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1493 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1494 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1495 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1496 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1497

1498 *% means of periodogram power spectral density*

1499 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1500 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1501 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1502 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1503 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1504 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1505

1506 *% skewness of periodogram power spectral density*

1507 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1508 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1509 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1510 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1511 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1512 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1513

1514 *% kurtosis of periodogram power spectral density*

1515 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1516 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1517 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1518 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1519 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1520 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1521

1522 *% min of periodogram power spectral density*

1523 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1524 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1525 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1526 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1527 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1528 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1529

1530 *% max of periodogram power spectral density*

1531 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1532 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1533 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1534 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1535 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1536 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1537

1538 *% 5 percentile of derivates*

1539 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1540 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1541 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1542 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1543 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1544 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1545

1546 *% 25 percentile of derivates*

1547 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1548 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1549 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1550 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1551 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1552 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1553

1554 *% 75 percentile of derivates*

1555 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1556 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1557 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1558 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1559 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1560 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1561

1562 *% 95 percentile of derivates*

1563 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1564 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1565 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1566 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1567 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1568 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

1569

1570

1571 *% label*

1572 F(1,102) = 0;

1573

1574 FeatureTable = vertcat(FeatureTable, F);

1575

1576

1577 *% vp023\_300*

1578 file = 'F:\Processed\Splitted\vp023\_splitted\_300\_beforeMS.csv';

1579

1580 *% read .csv file*

1581 fprintf('loading File ...\n');

1582 fprintf('Filename: %s', file(23:40));

1583 fprintf('\n');

1584 J = dlmread(file);

1585

1586 *% calculate features*

1587 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1588

1589 *% average*

1590 F(1,1) = mean(J(:,2)); *%ECG*

1591 F(1,2) = mean(J(:,3)); *%HR*

1592 F(1,3) = mean(J(:,4)); *%HrvHf*

1593 F(1,4) = mean(J(:,5)); *%HrvLf*

1594 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1595 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1596 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1597 F(1,8) = mean(J(:,9)); *%HrvSd1*

1598 F(1,9) = mean(J(:,10)); *%HrvSd2*

1599 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1600 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1601 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1602 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1603 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1604

1605 *% variance*

1606 F(1,15) = var(J(:,2)); *%ECG*

1607 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1608 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1610 *% brute force feature extraction*

1611 *% means of derivates*

1612 F(1,18) = mean(diff(J(:,2))); *% dECG*

1613 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1614 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1615 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1616 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1617 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1618

1619 *% skewness of derivates*

1620 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1621 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1622 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1623 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1624 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1625 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1626

1627 *% kurtosis of derivates*

1628 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1629 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1630 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1631 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1632 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1633 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1634

1635 *% min of derivates*

1636 F(1,36) = min(diff(J(:,2))); *% dECG*

1637 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1638 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1639 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1640 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1641 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1642

1643 *% max of derivates*

1644 F(1,42) = max(diff(J(:,2))); *% dECG*

1645 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1646 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1647 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1648 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1649 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1650

1651 *% means of periodogram power spectral density*

1652 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1653 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1654 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1655 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1656 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1657 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1658

1659 *% skewness of periodogram power spectral density*

1660 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1661 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1662 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1663 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1664 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1665 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1667 *% kurtosis of periodogram power spectral density*

1668 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1669 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1670 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1671 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1672 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1673 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1674

1675 *% min of periodogram power spectral density*

1676 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1677 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1678 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1679 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1680 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1681 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1682

1683 *% max of periodogram power spectral density*

1684 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1685 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1686 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1687 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1688 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1689 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1690

1691 *% 5 percentile of derivates*

1692 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1693 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1694 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1695 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1696 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1697 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1698

1699 *% 25 percentile of derivates*

1700 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1701 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1702 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1703 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1704 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1705 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1706

1707 *% 75 percentile of derivates*

1708 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1709 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1710 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1711 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1712 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1713 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1714

1715 *% 95 percentile of derivates*

1716 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1717 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1718 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1719 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1720 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1721 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

|  |  |  |
| --- | --- | --- |
| 1723 |  | |
| 1724 |  | *% label* |
| 1725 |  | F(1,102) = 0; |
| 1726 |  |  |
| 1727 |  | FeatureTable = vertcat(FeatureTable, F); |
| 1728 |  |  |
| 1729 |  |  |
| 1730 | *%* | *vp024\_454* |
| 1731 |  | file = 'F:\Processed\Splitted\vp024\_splitted\_454\_beforeMS.csv'; |
| 1732 |  |  |
| 1733 |  | *% read .csv file* |
| 1734 |  | fprintf('loading File ...\n'); |
| 1735 |  | fprintf('Filename: %s', file(23:40)); |
| 1736 |  | fprintf('\n'); |
| 1737 |  | J = dlmread(file); |
| 1738 |  |  |
| 1739 |  | *% calculate features* |
| 1740 |  | *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd,* |

*HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE,*

*EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1741

1742 *% average*

1743 F(1,1) = mean(J(:,2)); *%ECG*

1744 F(1,2) = mean(J(:,3)); *%HR*

1745 F(1,3) = mean(J(:,4)); *%HrvHf*

1746 F(1,4) = mean(J(:,5)); *%HrvLf*

1747 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1748 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1749 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1750 F(1,8) = mean(J(:,9)); *%HrvSd1*

1751 F(1,9) = mean(J(:,10)); *%HrvSd2*

1752 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1753 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1754 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1755 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1756 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1757

1758 *% variance*

1759 F(1,15) = var(J(:,2)); *%ECG*

1760 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1761 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1762

1763 *% brute force feature extraction*

1764 *% means of derivates*

1765 F(1,18) = mean(diff(J(:,2))); *% dECG*

1766 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1767 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1768 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1769 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1770 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1771

1772 *% skewness of derivates*

1773 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1774 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1775 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1776 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1777 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1778 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1780 *% kurtosis of derivates*

1781 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1782 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1783 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1784 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1785 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1786 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1787

1788 *% min of derivates*

1789 F(1,36) = min(diff(J(:,2))); *% dECG*

1790 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1791 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1792 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1793 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1794 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1795

1796 *% max of derivates*

1797 F(1,42) = max(diff(J(:,2))); *% dECG*

1798 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1799 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1800 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1801 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1802 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1803

1804 *% means of periodogram power spectral density*

1805 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1806 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1807 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1808 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1809 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1810 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1811

1812 *% skewness of periodogram power spectral density*

1813 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1814 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1815 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1816 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1817 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1818 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1819

1820 *% kurtosis of periodogram power spectral density*

1821 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1822 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1823 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1824 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1825 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1826 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1827

1828 *% min of periodogram power spectral density*

1829 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1830 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1831 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1832 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1833 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1834 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1835

1836 *% max of periodogram power spectral density*

1837 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1838 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1839 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1840 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1841 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1842 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1843

1844 *% 5 percentile of derivates*

1845 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1846 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

1847 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

1848 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

1849 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

1850 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

1851

1852 *% 25 percentile of derivates*

1853 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

1854 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

1855 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

1856 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

1857 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

1858 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

1859

1860 *% 75 percentile of derivates*

1861 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

1862 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

1863 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

1864 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

1865 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

1866 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

1867

1868 *% 95 percentile of derivates*

1869 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

1870 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

1871 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

1872 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

1873 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

1874 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

|  |  |  |
| --- | --- | --- |
| 1875 |  | |
| 1876 |
| 1877 |  | *% label* |
| 1878 |  | F(1,102) = 0; |
| 1879 |  |  |
| 1880 |  | FeatureTable = vertcat(FeatureTable, F); |
| 1881 |  |  |
| 1882 |  |  |
| 1883 | *%* | *vp024\_453* |
| 1884 |  | file = 'F:\Processed\Splitted\vp024\_splitted\_453\_beforeMS.csv'; |
| 1885 |  |  |
| 1886 |  | *% read .csv file* |
| 1887 |  | fprintf('loading File ...\n'); |
| 1888 |  | fprintf('Filename: %s', file(23:40)); |
| 1889 |  | fprintf('\n'); |
| 1890 |  | J = dlmread(file); |
| 1891 |  |  |
| 1892 |  | *% calculate features* |

1893 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

1894

1895 *% average*

1896 F(1,1) = mean(J(:,2)); *%ECG*

1897 F(1,2) = mean(J(:,3)); *%HR*

1898 F(1,3) = mean(J(:,4)); *%HrvHf*

1899 F(1,4) = mean(J(:,5)); *%HrvLf*

1900 F(1,5) = mean(J(:,6)); *%HrvLfHf*

1901 F(1,6) = mean(J(:,7)); *%HrvPnn50*

1902 F(1,7) = mean(J(:,8)); *%HrvRmssd*

1903 F(1,8) = mean(J(:,9)); *%HrvSd1*

1904 F(1,9) = mean(J(:,10)); *%HrvSd2*

1905 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

1906 F(1,11) = mean(J(:,12)); *%HrvSdnn*

1907 F(1,12) = mean(J(:,13)); *%HrvSdsd*

1908 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

1909 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

1910

1911 *% variance*

1912 F(1,15) = var(J(:,2)); *%ECG*

1913 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

1914 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

1915

1916 *% brute force feature extraction*

1917 *% means of derivates*

1918 F(1,18) = mean(diff(J(:,2))); *% dECG*

1919 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

1920 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

1921 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

1922 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1923 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1924

1925 *% skewness of derivates*

1926 F(1,24) = skewness(diff(J(:,2))); *% dECG*

1927 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

1928 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

1929 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

1930 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1931 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1932

1933 *% kurtosis of derivates*

1934 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

1935 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

1936 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

1937 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

1938 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1939 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1940

1941 *% min of derivates*

1942 F(1,36) = min(diff(J(:,2))); *% dECG*

1943 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

1944 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

1945 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

1946 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1947 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1948

1949 *% max of derivates*

1950 F(1,42) = max(diff(J(:,2))); *% dECG*

1951 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

1952 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

1953 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

1954 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

1955 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

1956

1957 *% means of periodogram power spectral density*

1958 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

1959 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

1960 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1961 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1962 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1963 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1964

1965 *% skewness of periodogram power spectral density*

1966 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

1967 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

1968 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1969 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1970 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1971 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1972

1973 *% kurtosis of periodogram power spectral density*

1974 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

1975 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

1976 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1977 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1978 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

1979 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1980

1981 *% min of periodogram power spectral density*

1982 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

1983 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

1984 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1985 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1986 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1987 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1988

1989 *% max of periodogram power spectral density*

1990 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

1991 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

1992 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

1993 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

1994 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

1995 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

1996

1997 *% 5 percentile of derivates*

1998 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

1999 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2000 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2001 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2002 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2003 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2004

2005 *% 25 percentile of derivates*

2006 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2007 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2008 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2009 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2010 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2011 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2012

2013 *% 75 percentile of derivates*

2014 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2015 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2016 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2017 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2018 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2019 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2020

2021 *% 95 percentile of derivates*

2022 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2023 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2024 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2025 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2026 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2027 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2028

2029

2030 *% label*

2031 F(1,102) = 0;

2032

2033 FeatureTable = vertcat(FeatureTable, F);

2034

2035

2036 *% vp028\_732*

2037 file = 'F:\Processed\Splitted\vp028\_splitted\_732\_beforeMS.csv';

2038

2039 *% read .csv file*

2040 fprintf('loading File ...\n');

2041 fprintf('Filename: %s', file(23:40));

2042 fprintf('\n');

2043 J = dlmread(file);

2044

2045 *% calculate features*

2046 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2047

2048 *% average*

2049 F(1,1) = mean(J(:,2)); *%ECG*

2050 F(1,2) = mean(J(:,3)); *%HR*

2051 F(1,3) = mean(J(:,4)); *%HrvHf*

2052 F(1,4) = mean(J(:,5)); *%HrvLf*

2053 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2054 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2055 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2056 F(1,8) = mean(J(:,9)); *%HrvSd1*

2057 F(1,9) = mean(J(:,10)); *%HrvSd2*

2058 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2059 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2060 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2061 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2062 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2063

2064 *% variance*

2065 F(1,15) = var(J(:,2)); *%ECG*

2066 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2067 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2068

2069 *% brute force feature extraction*

2070 *% means of derivates*

2071 F(1,18) = mean(diff(J(:,2))); *% dECG*

2072 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2073 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2074 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2075 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2076 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2077

2078 *% skewness of derivates*

2079 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2080 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2081 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2082 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2083 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2084 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2085

2086 *% kurtosis of derivates*

2087 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2088 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2089 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2090 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2091 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2092 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2093

2094 *% min of derivates*

2095 F(1,36) = min(diff(J(:,2))); *% dECG*

2096 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2097 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2098 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2099 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2100 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2101

2102 *% max of derivates*

2103 F(1,42) = max(diff(J(:,2))); *% dECG*

2104 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

2105 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

2106 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

2107 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2108 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2109

2110 *% means of periodogram power spectral density*

2111 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2112 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2113 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2114 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2115 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2116 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2117

2118 *% skewness of periodogram power spectral density*

2119 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2120 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2121 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2122 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2123 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2124 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2125

2126 *% kurtosis of periodogram power spectral density*

2127 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2128 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2129 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2130 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2131 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2132 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2133

2134 *% min of periodogram power spectral density*

2135 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2136 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2137 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2138 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2139 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2140 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2141

2142 *% max of periodogram power spectral density*

2143 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2144 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2145 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2146 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2147 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2148 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2149

2150 *% 5 percentile of derivates*

2151 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2152 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2153 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2154 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2155 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2156 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2157

2158 *% 25 percentile of derivates*

2159 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2160 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2161 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2162 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2163 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2164 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2165

2166 *% 75 percentile of derivates*

2167 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2168 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2169 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2170 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2171 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2172 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2173

2174 *% 95 percentile of derivates*

2175 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2176 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2177 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2178 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2179 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2180 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2181

2182

2183 *% label*

2184 F(1,102) = 0;

2185

2186 FeatureTable = vertcat(FeatureTable, F);

2187

2188

2189 *% vp028\_731*

2190 file = 'F:\Processed\Splitted\vp028\_splitted\_731\_beforeMS.csv';

2191

2192 *% read .csv file*

2193 fprintf('loading File ...\n');

2194 fprintf('Filename: %s', file(23:40));

2195 fprintf('\n');

2196 J = dlmread(file);

2197

2198 *% calculate features*

2199 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2200

2201 *% average*

2202 F(1,1) = mean(J(:,2)); *%ECG*

2203 F(1,2) = mean(J(:,3)); *%HR*

2204 F(1,3) = mean(J(:,4)); *%HrvHf*

2205 F(1,4) = mean(J(:,5)); *%HrvLf*

2206 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2207 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2208 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2209 F(1,8) = mean(J(:,9)); *%HrvSd1*

2210 F(1,9) = mean(J(:,10)); *%HrvSd2*

2211 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2212 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2213 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2214 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2215 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2216

2217 *% variance*

2218 F(1,15) = var(J(:,2)); *%ECG*

2219 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2220 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2221

2222 *% brute force feature extraction*

2223 *% means of derivates*

2224 F(1,18) = mean(diff(J(:,2))); *% dECG*

2225 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2226 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2227 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2228 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2229 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2230

2231 *% skewness of derivates*

2232 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2233 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2234 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2235 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2236 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2237 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2238

2239 *% kurtosis of derivates*

2240 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2241 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2242 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2243 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2244 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2245 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2246

2247 *% min of derivates*

2248 F(1,36) = min(diff(J(:,2))); *% dECG*

2249 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2250 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2251 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2252 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2253 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2254

2255 *% max of derivates*

2256 F(1,42) = max(diff(J(:,2))); *% dECG*

2257 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

2258 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

2259 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

2260 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2261 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2262

2263 *% means of periodogram power spectral density*

2264 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2265 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2266 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2267 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2268 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2269 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2270

2271 *% skewness of periodogram power spectral density*

2272 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2273 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2274 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2275 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2276 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2277 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2278

2279 *% kurtosis of periodogram power spectral density*

2280 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2281 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2282 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2283 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2284 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2285 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2286

2287 *% min of periodogram power spectral density*

2288 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2289 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2290 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2291 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2292 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2293 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2294

2295 *% max of periodogram power spectral density*

2296 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2297 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2298 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2299 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2300 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2301 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2302

2303 *% 5 percentile of derivates*

2304 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2305 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2306 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2307 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2308 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2309 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2310

2311 *% 25 percentile of derivates*

2312 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2313 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2314 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2315 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2316 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2317 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2318

2319 *% 75 percentile of derivates*

2320 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2321 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2322 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2323 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2324 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2325 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2326

2327 *% 95 percentile of derivates*

2328 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2329 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2330 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2331 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2332 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2333 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2334

2335

2336 *% label*

2337 F(1,102) = 0;

2338

2339 FeatureTable = vertcat(FeatureTable, F);

2340

2341

2342 *% vp029\_18*

2343 file = 'F:\Processed\Splitted\vp029\_splitted\_18\_beforeMS.csv';

2344

2345 *% read .csv file*

2346 fprintf('loading File ...\n');

2347 fprintf('Filename: %s', file(23:40));

2348 fprintf('\n');

2349 J = dlmread(file);

2350

2351 *% calculate features*

2352 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2353

2354 *% average*

2355 F(1,1) = mean(J(:,2)); *%ECG*

2356 F(1,2) = mean(J(:,3)); *%HR*

2357 F(1,3) = mean(J(:,4)); *%HrvHf*

2358 F(1,4) = mean(J(:,5)); *%HrvLf*

2359 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2360 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2361 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2362 F(1,8) = mean(J(:,9)); *%HrvSd1*

2363 F(1,9) = mean(J(:,10)); *%HrvSd2*

2364 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2365 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2366 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2367 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2368 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2369

2370 *% variance*

2371 F(1,15) = var(J(:,2)); *%ECG*

2372 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2373 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2374

2375 *% brute force feature extraction*

2376 *% means of derivates*

2377 F(1,18) = mean(diff(J(:,2))); *% dECG*

2378 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2379 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2380 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2381 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2382 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2383

2384 *% skewness of derivates*

2385 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2386 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2387 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2388 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2389 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2390 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2391

2392 *% kurtosis of derivates*

2393 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2394 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2395 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2396 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2397 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2398 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2399

2400 *% min of derivates*

2401 F(1,36) = min(diff(J(:,2))); *% dECG*

2402 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2403 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2404 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2405 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2406 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2407

2408 *% max of derivates*

2409 F(1,42) = max(diff(J(:,2))); *% dECG*

2410 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

2411 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

2412 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

2413 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2414 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2415

2416 *% means of periodogram power spectral density*

2417 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2418 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2419 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2420 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2421 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2422 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2423

2424 *% skewness of periodogram power spectral density*

2425 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2426 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2427 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2428 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2429 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2430 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2431

2432 *% kurtosis of periodogram power spectral density*

2433 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2434 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2435 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2436 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2437 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2438 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2439

2440 *% min of periodogram power spectral density*

2441 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2442 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2443 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2444 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2445 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2446 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2447

2448 *% max of periodogram power spectral density*

2449 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2450 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2451 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2452 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2453 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2454 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2455

2456 *% 5 percentile of derivates*

2457 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2458 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2459 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2460 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2461 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2462 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2463

2464 *% 25 percentile of derivates*

2465 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2466 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2467 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2468 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2469 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2470 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2471

2472 *% 75 percentile of derivates*

2473 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2474 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2475 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2476 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2477 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2478 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2479

2480 *% 95 percentile of derivates*

2481 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2482 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2483 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2484 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2485 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2486 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2487

2488

2489 *% label*

2490 F(1,102) = 0;

2491

2492 FeatureTable = vertcat(FeatureTable, F);

2493

2494

2495 *% vp029\_17*

2496 file = 'F:\Processed\Splitted\vp029\_splitted\_17\_beforeMS.csv';

2497

2498 *% read .csv file*

2499 fprintf('loading File ...\n');

2500 fprintf('Filename: %s', file(23:40));

2501 fprintf('\n');

2502 J = dlmread(file);

2503

2504 *% calculate features*

2505 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2506

2507 *% average*

2508 F(1,1) = mean(J(:,2)); *%ECG*

2509 F(1,2) = mean(J(:,3)); *%HR*

2510 F(1,3) = mean(J(:,4)); *%HrvHf*

2511 F(1,4) = mean(J(:,5)); *%HrvLf*

2512 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2513 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2514 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2515 F(1,8) = mean(J(:,9)); *%HrvSd1*

2516 F(1,9) = mean(J(:,10)); *%HrvSd2*

2517 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2518 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2519 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2520 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2521 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2522

2523 *% variance*

2524 F(1,15) = var(J(:,2)); *%ECG*

2525 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2526 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2527

2528 *% brute force feature extraction*

2529 *% means of derivates*

2530 F(1,18) = mean(diff(J(:,2))); *% dECG*

2531 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2532 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2533 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2534 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2535 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2536

2537 *% skewness of derivates*

2538 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2539 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2540 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2541 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2542 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2543 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2544

2545 *% kurtosis of derivates*

2546 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2547 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2548 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2549 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2550 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2551 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2552

2553 *% min of derivates*

2554 F(1,36) = min(diff(J(:,2))); *% dECG*

2555 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2556 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2557 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2558 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2559 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2560

2561 *% max of derivates*

2562 F(1,42) = max(diff(J(:,2))); *% dECG*

2563 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2564 |  | F(1,44) | = | max(diff(J(:,17))); *%* | *dEYELIDOPENING* |
| 2565 |  | F(1,45) | = | max(diff(J(:,17),2)); | *% d2EYELIDOPENING* |
| 2566 |  | F(1,46) | = | max(diff(J(:,21))); *%* | *dFILTEREDPUPILDIAMETER* |
| 2567 |  | F(1,47) | = | max(diff(J(:,21),2)); | *% d2FILTEREDPUPILDIAMETER* |
| 2568 |  |  |  |  |  |
| 2569 |  | *% means* | *o* | *f periodogram power spe* | *ctral density* |

2570 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2571 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2572 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2573 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2574 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2575 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2576

2577 *% skewness of periodogram power spectral density*

2578 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2579 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2580 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2581 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2582 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2583 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2584

2585 *% kurtosis of periodogram power spectral density*

2586 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2587 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2588 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2589 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2590 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2591 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2592

2593 *% min of periodogram power spectral density*

2594 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2595 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2596 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2597 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2598 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2599 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2600

2601 *% max of periodogram power spectral density*

2602 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2603 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2604 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2605 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2606 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2607 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2608

2609 *% 5 percentile of derivates*

2610 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2611 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2612 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2613 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2614 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2615 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2616

2617 *% 25 percentile of derivates*

2618 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2619 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2620 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2621 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2622 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2623 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2624

2625 *% 75 percentile of derivates*

2626 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2627 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2628 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2629 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2630 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2631 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2632

2633 *% 95 percentile of derivates*

2634 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2635 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2636 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2637 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2638 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2639 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2640

2641

2642 *% label*

2643 F(1,102) = 0;

2644

2645 FeatureTable = vertcat(FeatureTable, F);

2646

2647

2648 *% vp030\_286*

2649 file = 'F:\Processed\Splitted\vp030\_splitted\_286\_beforeMS.csv';

2650

2651 *% read .csv file*

2652 fprintf('loading File ...\n');

2653 fprintf('Filename: %s', file(23:40));

2654 fprintf('\n');

2655 J = dlmread(file);

2656

2657 *% calculate features*

2658 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2659

2660 *% average*

2661 F(1,1) = mean(J(:,2)); *%ECG*

2662 F(1,2) = mean(J(:,3)); *%HR*

2663 F(1,3) = mean(J(:,4)); *%HrvHf*

2664 F(1,4) = mean(J(:,5)); *%HrvLf*

2665 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2666 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2667 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2668 F(1,8) = mean(J(:,9)); *%HrvSd1*

2669 F(1,9) = mean(J(:,10)); *%HrvSd2*

2670 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2671 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2672 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2673 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2674 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2675

2676 *% variance*

2677 F(1,15) = var(J(:,2)); *%ECG*

2678 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2679 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2681 *% brute force feature extraction*

2682 *% means of derivates*

2683 F(1,18) = mean(diff(J(:,2))); *% dECG*

2684 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2685 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2686 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2687 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2688 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2689

2690 *% skewness of derivates*

2691 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2692 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2693 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2694 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2695 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2696 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2697

2698 *% kurtosis of derivates*

2699 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2700 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2701 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2702 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2703 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2704 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2705

2706 *% min of derivates*

2707 F(1,36) = min(diff(J(:,2))); *% dECG*

2708 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2709 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2710 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2711 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2712 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2713

2714 *% max of derivates*

2715 F(1,42) = max(diff(J(:,2))); *% dECG*

2716 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

2717 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

2718 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

2719 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2720 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2721

2722 *% means of periodogram power spectral density*

2723 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2724 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2725 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2726 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2727 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2728 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2729

2730 *% skewness of periodogram power spectral density*

2731 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2732 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2733 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2734 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2735 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2736 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2738 *% kurtosis of periodogram power spectral density*

2739 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2740 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2741 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2742 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2743 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2744 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2745

2746 *% min of periodogram power spectral density*

2747 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2748 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2749 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2750 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2751 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2752 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2753

2754 *% max of periodogram power spectral density*

2755 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2756 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2757 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2758 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2759 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2760 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2761

2762 *% 5 percentile of derivates*

2763 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2764 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2765 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2766 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2767 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2768 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2769

2770 *% 25 percentile of derivates*

2771 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2772 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2773 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2774 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2775 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2776 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2777

2778 *% 75 percentile of derivates*

2779 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2780 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2781 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2782 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2783 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2784 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2785

2786 *% 95 percentile of derivates*

2787 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2788 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2789 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2790 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2791 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2792 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2794

|  |  |  |
| --- | --- | --- |
|  |  | |
| 2795 |  | *% label* |
| 2796 |  | F(1,102) = 0; |
| 2797 |  |  |
| 2798 |  | FeatureTable = vertcat(FeatureTable, F); |
| 2799 |  |  |
| 2800 |  |  |
| 2801 | *%* | *vp030\_285* |
| 2802 |  | file = 'F:\Processed\Splitted\vp030\_splitted\_285\_beforeMS.csv'; |
| 2803 |  |  |
| 2804 |  | *% read .csv file* |
| 2805 |  | fprintf('loading File ...\n'); |
| 2806 |  | fprintf('Filename: %s', file(23:40)); |
| 2807 |  | fprintf('\n'); |
| 2808 |  | J = dlmread(file); |
| 2809 |  |  |
| 2810 |  | *% calculate features* |
| 2811 |  | *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd,* |

*HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2812

2813 *% average*

2814 F(1,1) = mean(J(:,2)); *%ECG*

2815 F(1,2) = mean(J(:,3)); *%HR*

2816 F(1,3) = mean(J(:,4)); *%HrvHf*

2817 F(1,4) = mean(J(:,5)); *%HrvLf*

2818 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2819 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2820 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2821 F(1,8) = mean(J(:,9)); *%HrvSd1*

2822 F(1,9) = mean(J(:,10)); *%HrvSd2*

2823 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2824 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2825 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2826 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2827 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2828

2829 *% variance*

2830 F(1,15) = var(J(:,2)); *%ECG*

2831 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2832 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2833

2834 *% brute force feature extraction*

2835 *% means of derivates*

2836 F(1,18) = mean(diff(J(:,2))); *% dECG*

2837 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2838 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2839 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2840 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2841 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2842

2843 *% skewness of derivates*

2844 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2845 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2846 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

2847 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

2848 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2849 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2851 *% kurtosis of derivates*

2852 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

2853 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

2854 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

2855 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

2856 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2857 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2858

2859 *% min of derivates*

2860 F(1,36) = min(diff(J(:,2))); *% dECG*

2861 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

2862 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

2863 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

2864 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2865 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2866

2867 *% max of derivates*

2868 F(1,42) = max(diff(J(:,2))); *% dECG*

2869 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

2870 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

2871 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

2872 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2873 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2874

2875 *% means of periodogram power spectral density*

2876 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

2877 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

2878 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2879 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2880 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2881 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2882

2883 *% skewness of periodogram power spectral density*

2884 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

2885 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

2886 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2887 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2888 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2889 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2890

2891 *% kurtosis of periodogram power spectral density*

2892 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

2893 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

2894 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2895 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2896 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

2897 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2898

2899 *% min of periodogram power spectral density*

2900 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

2901 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

2902 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2903 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2904 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2905 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2906

2907 *% max of periodogram power spectral density*

2908 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

2909 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

2910 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

2911 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

2912 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

2913 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

2914

2915 *% 5 percentile of derivates*

2916 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

2917 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

2918 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

2919 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

2920 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

2921 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

2922

2923 *% 25 percentile of derivates*

2924 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

2925 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

2926 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

2927 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

2928 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

2929 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

2930

2931 *% 75 percentile of derivates*

2932 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

2933 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

2934 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

2935 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

2936 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

2937 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

2938

2939 *% 95 percentile of derivates*

2940 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

2941 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

2942 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

2943 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

2944 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

2945 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

2946

2947

2948 *% label*

2949 F(1,102) = 0;

2950

2951 FeatureTable = vertcat(FeatureTable, F);

2952

2953

2954 *% vp031\_93*

2955 file = 'F:\Processed\Splitted\vp031\_splitted\_93\_beforeMS.csv';

2956

2957 *% read .csv file*

2958 fprintf('loading File ...\n');

2959 fprintf('Filename: %s', file(23:40));

2960 fprintf('\n');

2961 J = dlmread(file);

2962

2963 *% calculate features*

2964 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

2965

2966 *% average*

2967 F(1,1) = mean(J(:,2)); *%ECG*

2968 F(1,2) = mean(J(:,3)); *%HR*

2969 F(1,3) = mean(J(:,4)); *%HrvHf*

2970 F(1,4) = mean(J(:,5)); *%HrvLf*

2971 F(1,5) = mean(J(:,6)); *%HrvLfHf*

2972 F(1,6) = mean(J(:,7)); *%HrvPnn50*

2973 F(1,7) = mean(J(:,8)); *%HrvRmssd*

2974 F(1,8) = mean(J(:,9)); *%HrvSd1*

2975 F(1,9) = mean(J(:,10)); *%HrvSd2*

2976 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

2977 F(1,11) = mean(J(:,12)); *%HrvSdnn*

2978 F(1,12) = mean(J(:,13)); *%HrvSdsd*

2979 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

2980 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

2981

2982 *% variance*

2983 F(1,15) = var(J(:,2)); *%ECG*

2984 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

2985 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

2986

2987 *% brute force feature extraction*

2988 *% means of derivates*

2989 F(1,18) = mean(diff(J(:,2))); *% dECG*

2990 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

2991 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

2992 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

2993 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

2994 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

2995

2996 *% skewness of derivates*

2997 F(1,24) = skewness(diff(J(:,2))); *% dECG*

2998 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

2999 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

3000 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

3001 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3002 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3003

3004 *% kurtosis of derivates*

3005 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

3006 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

3007 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

3008 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

3009 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3010 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3011

3012 *% min of derivates*

3013 F(1,36) = min(diff(J(:,2))); *% dECG*

3014 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

3015 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

3016 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

3017 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3018 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3019

3020 *% max of derivates*

3021 F(1,42) = max(diff(J(:,2))); *% dECG*

3022 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

3023 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

3024 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

3025 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3026 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3027

3028 *% means of periodogram power spectral density*

3029 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

3030 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

3031 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3032 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3033 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3034 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3035

3036 *% skewness of periodogram power spectral density*

3037 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

3038 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

3039 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3040 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3041 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3042 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3043

3044 *% kurtosis of periodogram power spectral density*

3045 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

3046 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

3047 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3048 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3049 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3050 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3051

3052 *% min of periodogram power spectral density*

3053 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

3054 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

3055 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3056 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3057 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3058 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3059

3060 *% max of periodogram power spectral density*

3061 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

3062 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

3063 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3064 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3065 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3066 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3067

3068 *% 5 percentile of derivates*

3069 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

3070 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

3071 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

3072 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

3073 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

3074 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

3075

3076 *% 25 percentile of derivates*

3077 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

3078 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

3079 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

3080 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

3081 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

3082 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

3083

3084 *% 75 percentile of derivates*

3085 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

3086 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

3087 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

3088 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

3089 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

3090 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

3091

3092 *% 95 percentile of derivates*

3093 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

3094 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

3095 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

3096 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

3097 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

3098 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

3099

3100

3101 *% label*

3102 F(1,102) = 0;

3103

3104 FeatureTable = vertcat(FeatureTable, F);

3105

3106

3107 *% vp031\_92*

3108 file = 'F:\Processed\Splitted\vp031\_splitted\_92\_beforeMS.csv';

3109

3110 *% read .csv file*

3111 fprintf('loading File ...\n');

3112 fprintf('Filename: %s', file(23:40));

3113 fprintf('\n');

3114 J = dlmread(file);

3115

3116 *% calculate features*

3117 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

3118

3119 *% average*

3120 F(1,1) = mean(J(:,2)); *%ECG*

3121 F(1,2) = mean(J(:,3)); *%HR*

3122 F(1,3) = mean(J(:,4)); *%HrvHf*

3123 F(1,4) = mean(J(:,5)); *%HrvLf*

3124 F(1,5) = mean(J(:,6)); *%HrvLfHf*

3125 F(1,6) = mean(J(:,7)); *%HrvPnn50*

3126 F(1,7) = mean(J(:,8)); *%HrvRmssd*

3127 F(1,8) = mean(J(:,9)); *%HrvSd1*

3128 F(1,9) = mean(J(:,10)); *%HrvSd2*

3129 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

3130 F(1,11) = mean(J(:,12)); *%HrvSdnn*

3131 F(1,12) = mean(J(:,13)); *%HrvSdsd*

3132 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

3133 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

3134

3135 *% variance*

3136 F(1,15) = var(J(:,2)); *%ECG*

3137 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

3138 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

3139

3140 *% brute force feature extraction*

3141 *% means of derivates*

3142 F(1,18) = mean(diff(J(:,2))); *% dECG*

3143 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

3144 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

3145 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

3146 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3147 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3148

3149 *% skewness of derivates*

3150 F(1,24) = skewness(diff(J(:,2))); *% dECG*

3151 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

3152 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

3153 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

3154 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3155 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3156

3157 *% kurtosis of derivates*

3158 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

3159 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

3160 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

3161 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

3162 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3163 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3164

3165 *% min of derivates*

3166 F(1,36) = min(diff(J(:,2))); *% dECG*

3167 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

3168 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

3169 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

3170 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3171 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3172

3173 *% max of derivates*

3174 F(1,42) = max(diff(J(:,2))); *% dECG*

3175 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

3176 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

3177 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

3178 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3179 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3180

3181 *% means of periodogram power spectral density*

3182 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

3183 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

3184 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3185 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3186 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3187 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3188

3189 *% skewness of periodogram power spectral density*

3190 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

3191 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

3192 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3193 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3194 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3195 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3196

3197 *% kurtosis of periodogram power spectral density*

3198 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

3199 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

3200 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3201 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3202 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3203 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3204

3205 *% min of periodogram power spectral density*

3206 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

3207 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

3208 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3209 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3210 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3211 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3212

3213 *% max of periodogram power spectral density*

3214 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

3215 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

3216 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3217 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3218 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3219 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3220

3221 *% 5 percentile of derivates*

3222 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

3223 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

3224 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

3225 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

3226 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

3227 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

3228

3229 *% 25 percentile of derivates*

3230 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

3231 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

3232 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

3233 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

3234 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

3235 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

3236

3237 *% 75 percentile of derivates*

3238 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

3239 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

3240 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

3241 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

3242 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

3243 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

3244

3245 *% 95 percentile of derivates*

3246 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

3247 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

3248 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

3249 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

3250 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

3251 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

3252

3253

3254 *% label*

3255 F(1,102) = 0;

3256

3257 FeatureTable = vertcat(FeatureTable, F);

3258

3259

3260 *% vp032\_207*

3261 file = 'F:\Processed\Splitted\vp032\_splitted\_207\_beforeMS.csv';

3262

3263 *% read .csv file*

3264 fprintf('loading File ...\n');

3265 fprintf('Filename: %s', file(23:40));

3266 fprintf('\n');

3267 J = dlmread(file);

3268

3269 *% calculate features*

3270 *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd, HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE, EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

3271

3272 *% average*

3273 F(1,1) = mean(J(:,2)); *%ECG*

3274 F(1,2) = mean(J(:,3)); *%HR*

3275 F(1,3) = mean(J(:,4)); *%HrvHf*

3276 F(1,4) = mean(J(:,5)); *%HrvLf*

3277 F(1,5) = mean(J(:,6)); *%HrvLfHf*

3278 F(1,6) = mean(J(:,7)); *%HrvPnn50*

3279 F(1,7) = mean(J(:,8)); *%HrvRmssd*

3280 F(1,8) = mean(J(:,9)); *%HrvSd1*

3281 F(1,9) = mean(J(:,10)); *%HrvSd2*

3282 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

3283 F(1,11) = mean(J(:,12)); *%HrvSdnn*

3284 F(1,12) = mean(J(:,13)); *%HrvSdsd*

3285 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

3286 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

3287

3288 *% variance*

3289 F(1,15) = var(J(:,2)); *%ECG*

3290 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

3291 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

3292

3293 *% brute force feature extraction*

3294 *% means of derivates*

3295 F(1,18) = mean(diff(J(:,2))); *% dECG*

3296 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

3297 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

3298 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

3299 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3300 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3301

3302 *% skewness of derivates*

3303 F(1,24) = skewness(diff(J(:,2))); *% dECG*

3304 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

3305 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

3306 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

3307 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3308 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3309

3310 *% kurtosis of derivates*

3311 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

3312 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

3313 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

3314 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

3315 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3316 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3317

3318 *% min of derivates*

3319 F(1,36) = min(diff(J(:,2))); *% dECG*

3320 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

3321 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

3322 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

3323 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3324 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3325

3326 *% max of derivates*

3327 F(1,42) = max(diff(J(:,2))); *% dECG*

3328 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

3329 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

3330 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

3331 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3332 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3333

3334 *% means of periodogram power spectral density*

3335 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

3336 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

3337 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3338 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3339 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3340 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3341

3342 *% skewness of periodogram power spectral density*

3343 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

3344 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

3345 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3346 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3347 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3348 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3349

3350 *% kurtosis of periodogram power spectral density*

3351 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

3352 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

3353 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3354 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3355 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3356 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3357

3358 *% min of periodogram power spectral density*

3359 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

3360 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

3361 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3362 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3363 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3364 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3365

3366 *% max of periodogram power spectral density*

3367 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

3368 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

3369 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3370 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3371 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3372 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3373

3374 *% 5 percentile of derivates*

3375 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

3376 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

3377 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

3378 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

3379 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

3380 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

3381

3382 *% 25 percentile of derivates*

3383 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

3384 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

3385 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

3386 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

3387 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

3388 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

3389

3390 *% 75 percentile of derivates*

3391 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

3392 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

3393 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

3394 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

3395 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

3396 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

3397

3398 *% 95 percentile of derivates*

3399 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

3400 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

3401 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

3402 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

3403 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

3404 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

3405

3406

3407 *% label*

3408 F(1,102) = 0;

3409

3410 FeatureTable = vertcat(FeatureTable, F);

3411

3412

|  |  |  |
| --- | --- | --- |
| 3413 | *%* | *vp032\_206* |
| 3414 |  | file = 'F:\Processed\Splitted\vp032\_splitted\_206\_beforeMS.csv'; |
| 3415 |  |  |
| 3416 |  | *% read .csv file* |
| 3417 |  | fprintf('loading File ...\n'); |
| 3418 |  | fprintf('Filename: %s', file(23:40)); |
| 3419 |  | fprintf('\n'); |
| 3420 |  | J = dlmread(file); |
| 3421 |  |  |
| 3422 |  | *% calculate features* |
| 3423 |  | *% HEADER(TIMELINE, ECG, HR, HrvHf, HrvLf, HrvLfHf, HrvPnn50, HrvRmssd,* |

*HrvSd1, HrvSd2, HrvSd2Sd1, HrvSdnn, HrvSdsd, TIMESTAMP, FRAMENUMBER, FRAMERATE,*

*EYELIDOPENING, EYELIDOPENINGQ, PUPILDIAMETER, PUPILDIAMETERQ, FILTEREDPUPILDIAMETER, FILTEREDPUPILDIAMETERQ);*

3424

3425 *% average*

3426 F(1,1) = mean(J(:,2)); *%ECG*

3427 F(1,2) = mean(J(:,3)); *%HR*

3428 F(1,3) = mean(J(:,4)); *%HrvHf*

3429 F(1,4) = mean(J(:,5)); *%HrvLf*

3430 F(1,5) = mean(J(:,6)); *%HrvLfHf*

3431 F(1,6) = mean(J(:,7)); *%HrvPnn50*

3432 F(1,7) = mean(J(:,8)); *%HrvRmssd*

3433 F(1,8) = mean(J(:,9)); *%HrvSd1*

3434 F(1,9) = mean(J(:,10)); *%HrvSd2*

3435 F(1,10) = mean(J(:,11)); *%HrvSd2Sd1*

3436 F(1,11) = mean(J(:,12)); *%HrvSdnn*

3437 F(1,12) = mean(J(:,13)); *%HrvSdsd*

3438 F(1,13) = mean(J(:,17)); *%EYELIDOPENING*

3439 F(1,14) = mean(J(:,21)); *%FILTEREDPUPILDIAMETER*

3440

3441 *% variance*

3442 F(1,15) = var(J(:,2)); *%ECG*

3443 F(1,16) = var(J(:,17)); *%EYELIDOPENING*

3444 F(1,17) = var(J(:,21)); *%FILTEREDPUPILDIAMETER*

3445

3446 *% brute force feature extraction*

3447 *% means of derivates*

3448 F(1,18) = mean(diff(J(:,2))); *% dECG*

3449 F(1,19) = mean(diff(J(:,2),2)); *% d2ECG*

3450 F(1,20) = mean(diff(J(:,17))); *% dEYELIDOPENING*

3451 F(1,21) = mean(diff(J(:,17),2)); *% d2EYELIDOPENING*

3452 F(1,22) = mean(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3453 F(1,23) = mean(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3454

3455 *% skewness of derivates*

3456 F(1,24) = skewness(diff(J(:,2))); *% dECG*

3457 F(1,25) = skewness(diff(J(:,2),2)); *% d2ECG*

3458 F(1,26) = skewness(diff(J(:,17))); *% dEYELIDOPENING*

3459 F(1,27) = skewness(diff(J(:,17),2)); *% d2EYELIDOPENING*

3460 F(1,28) = skewness(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3461 F(1,29) = skewness(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3462

3463 *% kurtosis of derivates*

3464 F(1,30) = kurtosis(diff(J(:,2))); *% dECG*

3465 F(1,31) = kurtosis(diff(J(:,2),2)); *% d2ECG*

3466 F(1,32) = kurtosis(diff(J(:,17))); *% dEYELIDOPENING*

3467 F(1,33) = kurtosis(diff(J(:,17),2)); *% d2EYELIDOPENING*

3468 F(1,34) = kurtosis(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3469 F(1,35) = kurtosis(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3470

3471 *% min of derivates*

3472 F(1,36) = min(diff(J(:,2))); *% dECG*

3473 F(1,37) = min(diff(J(:,2),2)); *% d2ECG*

3474 F(1,38) = min(diff(J(:,17))); *% dEYELIDOPENING*

3475 F(1,39) = min(diff(J(:,17),2)); *% d2EYELIDOPENING*

3476 F(1,40) = min(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3477 F(1,41) = min(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3478

3479 *% max of derivates*

3480 F(1,42) = max(diff(J(:,2))); *% dECG*

3481 F(1,43) = max(diff(J(:,2),2)); *% d2ECG*

3482 F(1,44) = max(diff(J(:,17))); *% dEYELIDOPENING*

3483 F(1,45) = max(diff(J(:,17),2)); *% d2EYELIDOPENING*

3484 F(1,46) = max(diff(J(:,21))); *% dFILTEREDPUPILDIAMETER*

3485 F(1,47) = max(diff(J(:,21),2)); *% d2FILTEREDPUPILDIAMETER*

3486

3487 *% means of periodogram power spectral density*

3488 F(1,48) = mean(periodogram(diff(J(:,2)))); *% dECG*

3489 F(1,49) = mean(periodogram(diff(J(:,2),2))); *% d2ECG*

3490 F(1,50) = mean(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3491 F(1,51) = mean(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3492 F(1,52) = mean(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3493 F(1,53) = mean(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3494

3495 *% skewness of periodogram power spectral density*

3496 F(1,54) = skewness(periodogram(diff(J(:,2)))); *% dECG*

3497 F(1,55) = skewness(periodogram(diff(J(:,2),2))); *% d2ECG*

3498 F(1,56) = skewness(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3499 F(1,57) = skewness(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3500 F(1,58) = skewness(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3501 F(1,59) = skewness(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3502

3503 *% kurtosis of periodogram power spectral density*

3504 F(1,60) = kurtosis(periodogram(diff(J(:,2)))); *% dECG*

3505 F(1,61) = kurtosis(periodogram(diff(J(:,2),2))); *% d2ECG*

3506 F(1,62) = kurtosis(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3507 F(1,63) = kurtosis(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3508 F(1,64) = kurtosis(periodogram(diff(J(:,21)))); *%*

*dFILTEREDPUPILDIAMETER*

3509 F(1,65) = kurtosis(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3510

3511 *% min of periodogram power spectral density*

3512 F(1,66) = min(periodogram(diff(J(:,2)))); *% dECG*

3513 F(1,67) = min(periodogram(diff(J(:,2),2))); *% d2ECG*

3514 F(1,68) = min(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3515 F(1,69) = min(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3516 F(1,70) = min(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3517 F(1,71) = min(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3518

3519 *% max of periodogram power spectral density*

3520 F(1,72) = max(periodogram(diff(J(:,2)))); *% dECG*

3521 F(1,73) = max(periodogram(diff(J(:,2),2))); *% d2ECG*

3522 F(1,74) = max(periodogram(diff(J(:,17)))); *% dEYELIDOPENING*

3523 F(1,75) = max(periodogram(diff(J(:,17),2))); *% d2EYELIDOPENING*

3524 F(1,76) = max(periodogram(diff(J(:,21)))); *% dFILTEREDPUPILDIAMETER*

3525 F(1,77) = max(periodogram(diff(J(:,21),2))); *%*

*d2FILTEREDPUPILDIAMETER*

3526

3527 *% 5 percentile of derivates*

3528 F(1,78) = prctile(diff(J(:,2)),5); *% dECG*

3529 F(1,79) = prctile(diff(J(:,2),2),5); *% d2ECG*

3530 F(1,80) = prctile(diff(J(:,17)),5); *% dEYELIDOPENING*

3531 F(1,81) = prctile(diff(J(:,17),2),5); *% d2EYELIDOPENING*

3532 F(1,82) = prctile(diff(J(:,21)),5); *% dFILTEREDPUPILDIAMETER*

3533 F(1,83) = prctile(diff(J(:,21),2),5); *% d2FILTEREDPUPILDIAMETER*

3534

3535 *% 25 percentile of derivates*

3536 F(1,84) = prctile(diff(J(:,2)),25); *% dECG*

3537 F(1,85) = prctile(diff(J(:,2),2),25); *% d2ECG*

3538 F(1,86) = prctile(diff(J(:,17)),25); *% dEYELIDOPENING*

3539 F(1,87) = prctile(diff(J(:,17),2),25); *% d2EYELIDOPENING*

3540 F(1,88) = prctile(diff(J(:,21)),25); *% dFILTEREDPUPILDIAMETER*

3541 F(1,89) = prctile(diff(J(:,21),2),25); *% d2FILTEREDPUPILDIAMETER*

3542

3543 *% 75 percentile of derivates*

3544 F(1,90) = prctile(diff(J(:,2)),75); *% dECG*

3545 F(1,91) = prctile(diff(J(:,2),2),75); *% d2ECG*

3546 F(1,92) = prctile(diff(J(:,17)),75); *% dEYELIDOPENING*

3547 F(1,93) = prctile(diff(J(:,17),2),75); *% d2EYELIDOPENING*

3548 F(1,94) = prctile(diff(J(:,21)),75); *% dFILTEREDPUPILDIAMETER*

3549 F(1,95) = prctile(diff(J(:,21),2),75); *% d2FILTEREDPUPILDIAMETER*

3550

3551 *% 95 percentile of derivates*

3552 F(1,96) = prctile(diff(J(:,2)),95); *% dECG*

3553 F(1,97) = prctile(diff(J(:,2),2),95); *% d2ECG*

3554 F(1,98) = prctile(diff(J(:,17)),95); *% dEYELIDOPENING*

3555 F(1,99) = prctile(diff(J(:,17),2),95); *% d2EYELIDOPENING*

3556 F(1,100) = prctile(diff(J(:,21)),95); *% dFILTEREDPUPILDIAMETER*

3557 F(1,101) = prctile(diff(J(:,21),2),95); *% d2FILTEREDPUPILDIAMETER*

3558

3559

3560 *% label*

3561 F(1,102) = 0;

3562

3563 FeatureTable = vertcat(FeatureTable, F);

3564

3565 *% write to csv*

3566 fprintf('Writing file...\n');

3567 CSVfile = strcat('F:\Processed\','feature array','.csv'); *%where to store the outputs...*

3568 dlmwrite(CSVfile, FeatureTable,'precision','%10.5f'); *%missing header*

3569 fprintf('Done! ');

3570

3571 *%% generate feature Table*

3572

3573 FeatureTable = array2table(FeatureTable);

3574 FeatureTable.Properties.VariableNames = {'meanECG' 'HR' 'HrvHf' 'HrvLf' 'HrvLfHf'

'HrvPnn50' 'HrvRmssd' 'HrvSd1' 'HrvSd2' 'HrvSd2Sd1' 'HrvSdnn' 'HrvSdsd'

'meanEYELIDOPENING' 'meanFILTEREDPUPILDIAMETER' 'varECG' 'varEYELIDOPENING'

'varFILTEREDPUPILDIAMETER' 'meandECG' 'meand2ECG' 'meandEYELIDOPENING'

'meand2EYELIDOPENING' 'meandFILTEREDPUPILDIAMETER' 'meand2FILTEREDPUPILDIAMETER'

'skwdECG' 'skwd2ECG' 'skwdEYELIDOPENING' 'skwd2EYELIDOPENING'

'skwdFILTEREDPUPILDIAMETER' 'skwd2FILTEREDPUPILDIAMETER' 'kurtdECG' 'kurtd2ECG'

'kurtdEYELIDOPENING' 'kurtd2EYELIDOPENING' 'kurtdFILTEREDPUPILDIAMETER'

'kurtd2FILTEREDPUPILDIAMETER' 'mindECG' 'mind2ECG' 'mindEYELIDOPENING'

'mind2EYELIDOPENING' 'mindFILTEREDPUPILDIAMETER' 'mind2FILTEREDPUPILDIAMETER'

'maxdECG' 'maxd2ECG' 'maxdEYELIDOPENING' 'maxd2EYELIDOPENING'

'maxdFILTEREDPUPILDIAMETER' 'maxd2FILTEREDPUPILDIAMETER' 'meanPSDdECG' 'meanPSDd2ECG'

'meanPSDdEYELIDOPENING' 'meanPSDd2EYELIDOPENING' 'meanPSDdFILTEREDPUPILDIAMETER'

'meanPSDd2FILTEREDPUPILDIAMETER' 'skwPSDdECG' 'skwPSDd2ECG' 'skwPSDdEYELIDOPENING'

'skwPSDd2EYELIDOPENING' 'skwPSDdFILTEREDPUPILDIAMETER' 'skwPSDd2FILTEREDPUPILDIAMETER'

'kurtPSDdECG' 'kurtPSDd2ECG' 'kurtPSDdEYELIDOPENING' 'kurtPSDd2EYELIDOPENING'

'kurtPSDdFILTEREDPUPILDIAMETER' 'kurtPSDd2FILTEREDPUPILDIAMETER' 'minPSDdECG'

'minPSDd2ECG' 'minPSDdEYELIDOPENING' 'minPSDd2EYELIDOPENING'

'minPSDdFILTEREDPUPILDIAMETER' 'minPSDd2FILTEREDPUPILDIAMETER' 'maxPSDdECG'

'maxPSDd2ECG' 'maxPSDdEYELIDOPENING' 'maxPSDd2EYELIDOPENING'

'maxPSDdFILTEREDPUPILDIAMETER' 'maxPSDd2FILTEREDPUPILDIAMETER' 'prct5dECG'

'prct5d2ECG' 'prct5dEYELIDOPENING' 'prct5d2EYELIDOPENING'

'prct5dFILTEREDPUPILDIAMETER' 'prct5d2FILTEREDPUPILDIAMETER' 'prct25dECG'

'prct25d2ECG' 'prct25dEYELIDOPENING' 'prct25d2EYELIDOPENING'

'prct25dFILTEREDPUPILDIAMETER' 'prct25d2FILTEREDPUPILDIAMETER' 'prct75dECG'

'prct75d2ECG' 'prct75dEYELIDOPENING' 'prct75d2EYELIDOPENING'

'prct75dFILTEREDPUPILDIAMETER' 'prct75d2FILTEREDPUPILDIAMETER' 'prct95dECG'

'prct95d2ECG' 'prct95dEYELIDOPENING' 'prct95d2EYELIDOPENING'

'prct95dFILTEREDPUPILDIAMETER' 'prct95d2FILTEREDPUPILDIAMETER' 'Microsleep'};

3575 writetable(FeatureTable,'F:\Processed\FeatureTable.csv');

3576

3577

3578

105

106 fprintf('Data Processing completed!');

107