SeungMin Lee

Department of Electronics Engineering
The Kyungpook National University
80, Daehak-ro
Buk-gu, Daegu 41566
Republic of Korea

Phone: (010) 4733-7524
Office: 701 IT1 KNU
Email: lsm1106@knu.ac.kr

Interest

My field of research is image processing and bio-signal processing. Until the early part of the Ph.D. course, I studied defect detection in TFT-LCD images. Based on this experience, I have studied the detection of abnormal heartbeat in ECG signals. I obtained various results ranging from fiducial point detection, feature extraction, and abnormal heartbeat detection and classification in the research process. The goal is to develop a complete ECG signal analysis program by organizing the results of the study.

Education

KNU(Kyungpook National University) — Daegu, S.Korea

Ph.D in School of Electronics Engineering — Mar. 2013 - Feb. 2018

Thesis Title : Knowledge-based arrhythmia classification using linear approximation of ECG signal

Adviser : Kil Houm Park

Area of Study : Image Processing, Defect Detection, Bio Signal Analysis, ECG Analysis

KNU(Kyungpook National University) — Daegu, S.Korea

M.S. in Mathematics — Mar. 2010 - Feb. 2012

Thesis Title : Mean Shift Based on Matrix Means

Adviser : Yongdo Lim

Area of Study : Linear Algebra, Numerical Analysis

KNU(Kyungpook National University) — Daegu, S.Korea

B.S. in Mathematics — Mar. 2006 - Feb. 2010

Area of Study : Linear Algebra, Numerical Analysis

Current Positions

Post Doc. in the Kyungpook National University, Sep. 2018-present.

Publications

Internaltional Journal

■ S Lee, Y Jeong, J Kwak, D Park, KH Park, "Advanced Real-Time Dynamic Programming in the Polygonal Approximation of ECG Signals for a Lightweight Embedded Device," IEEE Access, vol. 7, pp. 162850-162861, 2019.

■ S Lee, Y Jeong, D Park, B-J Yun, KH Park, "Efficient Fiducial Point Detection of ECG QRS Complex Based on Polygonal Approximation," Sensors, vol. 18, no. 12, pp. 1-16, 2018.

■ S Lee, D Park, KH Park, "QRS Complex Detection Based on Primitive," Journal of Communications and Networks, vol. 19, no. 5, pp. 442-450, 2017.

Domestic Journals

■ S Lee, KH Park, "Abnormal heartbeat detection based on shape and interval deformation for arrhythmia reading," Journal of the Korean Society of Marine Engineering, vol. 43, no. 9, pp. 761-767, 2019.

■ S Lee, KH Park, "Defect detection according to MAD in TFT-LCD panel image," Journal of Korean Institute of Intelligent Systems, vol. 28, no. 3, pp. 225-230, 2018.

■ S Lee, KH Park, "Defect enhancement algorithm based on saliency map in TFT-LCD cell image," Journal of the Korean Society of Marine Engineering, vol. 41, no. 9, pp. 908-913, 2017.

■ YT Jung, S Lee, KH Park, "Defect detection based on periodic cell pattern elimination in TFT-LCD cell images," Journal of the Korean Society of Marine Engineering, vol. 41, no. 3, pp. 251-257, 2017.

■ J Kim, S Lee, GS Ryu, JH Lee, KH Park, "Hierarchical Authentication Algorithm Using Curvature Based Fiducial Point Extraction of ECG Signals," Journal of the Korea Multimedia Society, vol. 20, no. 3, pp. 465-473, 2017.

■ S Lee, KH Park, "STD Defect Detection Algorithm by Using Cumulative Histogram in TFT-LCD Image," Journal of the Korea Multimedia Society, vol. 19, no. 8, pp. 1288-1296, 2016.

■ JH Kim, S Lee, KH Park, "P-Waves and T-Wave Detection Algorithm in the ECG Signals Using Step-by-Step Baseline Alignment," Journal of the Korea Multimedia Society, vol. 19, no. 6, pp. 1034-1042, 2016.

■ JH Kim, S Lee, KH Park, "Stepwise Detection of the QRS Complex in the ECG Signal," The Journal of Korean Institute of Communications and Information Sciences, vol. 41, no. 2, pp. 244-248, 2016.

■ S Lee, JS Kim, KH Park, "PVC Detection Based on the Distortion of QRS Complex on ECG Signal," The Journal of Korean Institute of Communications and Information Sciences, vol. 40, no. 4, pp. 731-735, 2015.

■ S Lee, C Ryu, KH Park, "Adaptive Detection of Unusual Heartbeat According to R-wave Distortion on ECG Signal," Journal of The Institute of Electronics and Information Engineers, vol. 51, no. 9, pp. 2086-2090, 2014.

■ S Lee, TH Kim, KH Park, "Sequential Defect Detection According to Defect Possibility in TFT-LCD Panel Image," Journal of The Institute of Electronics and Information Engineers, vol. 51, no. 4, pp. 799-803, 2014.

■ CD Jung, S Lee, BJ Yun, JJ Lee, I Choi, KH Park, "TFT-LCD Defect Detection Using Mean Difference Between Local Regions Based on Multi-scale Image Reconstruction," Journal of the Korea Multimedia Society, vol. 15, no. 4, pp. 439-448, 2012.

International Conference

■ S Lee and D Park, "Enhanced Dynamic Programming for Polygonal Approximation of ECG Signals," In 2020 IEEE 2nd Global Conference on Life Sciences and Technologies (LifeTech), pages 121-122, Osaka, Japan, Mar. 2020.

■ S Lee, Y Jeong, J Kwak, D Park, and KH Park,"Efficient Communication Overhead Reduction Using Polygonal Approximation-Based ECG Signal Compression," In 2019 International Conference on Artificial Intelligence in Information and Communication (ICAIIC), pages 58-61, Okinawa, Japan, Feb 2019.

Project Experience

1. Research on ECG abnormal heartbeat Detection and Classification

Korea Evaluation Institute of Industrial Technology(KEIT) Apr.2013-Nov.2014

Institute for Information & Communication Technology Promotion(IITP)
Dec.2014-Aug.2016

Position : Researcher

Developed an ECG fiducial point detection algorithm

Developed an effective construction algorithm of feature space based on fiducial point detection results.

Developed an detecting algorithm of abnormal heartbeat

National Research Foundation of Korea(NRF) Jun.2013-May.2016

National Research Foundation of Korea(NRF) May.2015-Apr.2017

Position : Senior researcher

ECG database construction and analysis

Developed an ECG fiducial point detection algorithm

Developed an effective construction algorithm of feature space based on fiducial point detection results.

Developed an classification method of abnormal heartbeat

National Research Foundation of Korea(NRF) Sep.2018-Present

Position : Principal Investigator

ECG database construction and analysis

Developed an ECG fiducial point detection algorithm

Developed an effective construction algorithm of feature space based on fiducial point detection results.

Developed an classification method of abnormal heartbeat

2. Research on TFT-LCD Defect Detection

LG Display Jun.2010-Dec.2011

Position : Assistant

Developed an algorithm of feature value extraction

Developed a GUI for image input and acquire feature value

Developed a GUI for measurement for image quality assessment

National Research Foundation of Korea(NRF) Jun.2013-May.2016

National Research Foundation of Korea(NRF) Mar.2017-Jan.2018

National Research Foundation of Korea(NRF) Sep.2018-Jan.2019

Position : Senior researcher

Developed an cell pattern remove algorthm on high-resolution TFT-LCD image

Developed an background intensity flow remove algorithm on low-resolution TFT-LCD image

Developed an effective method for defect detection on low and high resolution TFT-LCD image

3. Research on Face Information Analysis Technology for Gender and Age Estimation

Electronics and Telecommunications Research Institute(ETRI) Jun. 2017-Jan. 2018

Position : Assistant

Construction part of data set

4. Research on Adaptive Target Feature Extraction Method for Small Target Flying at High Speed on Sea Surface

Agency for Defense Development(ADD) Mar. 2013-Jul. 2013

Position : Researcher

Participated in DB acquisition construction and mark ground truth for analysis accuracy of segmentation algorithm

Developed particle filter to track target

Developed target detection algorithm based on multi-sensor images

Skills

MATLAB

Last updated: May 16, 2020