Sungju Park

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EDUCATION

Seoul Scholars International, Seoul, South Korea
Aug.2020-Present.
Expected graduation May, 2024

RESEARCH EXPERIENCE

FUNDUS DISEASE DIAGNOSIS PROGRAM: Independent research

May. 2022-Feb.2023

- Developed a machine learning model that diagnoses diseases based on people's fundus photos. designed a web page that provides services.
- Classified 24,000 fundus photographic data provided by 7 datasets into four results (normal, cataract, glaucoma, and diabetic retinopathy) using CNN with 90% accuracy of classification

Abstract: The recent development in artificial intelligence contributed to the utilization of information and communication technologies in medical fields. In ophthalmology, the fundus photograph decoding technology is receiving wider attention as it can easily detect the retinal disorders without having to embrace side effects or inconveniences that follow with pupil dilation test. As AI-based diagnostic technologies can effectively discover disorders in optic nerves, optic layers in retina, retinal vessels, it can be useful in early detection and health checks. This study therefore develops a model which classifies and analyzes 24,000 fundus photographs into four categories (normal, cataract, glaucoma, diabetic retinopathy) based on diagnostic data. The model is further realized into a website which will contribute to effective diagnoses of fundus diseases. Convolutional neural network (CNN, specialized in image processing) is applied as a learning model and EfficientNet was used to configure the network. Hyperparameter optimization was used for tuning, and the developed model is later realized as a public webpage. The designed model proves its excellence by reaching accuracy of 90.8% and other evaluation results. For the enhancement of performance, this model would necessitate extensive datasets and more intricate classifications of fundus diseases through collaborative research with medical institutions. The author anticipates more prompt diagnosis and treatment for patients with reduced accessibility and quicker diagnosis for medical professionals.

paper:https://psj03283.github.io/resume/Vision%20AI%20research%20paper.pdf

LOW COST FUNDUS CAMERA DEVELOPMENT: Independent research

Feb.2023-Present

- Developed a low-cost Fundus Camera utilizing an Arduino microcontroller and pantoscope technology to improve medical accessibility for patients in third-world countries.
- In progress of registration for a patent in ETRI.

GLAUCOMA OPTIC DISC RATIO CALCULATION PROGRAM: Independent research

Aug. 2021-Jan. 2022

- Developed a program that calculates the optic disc ratio of glaucoma images using image segmentation of optic disc and optic cup

- Followed the International Classification of Diseases (ICD-9) rule based on three-stage assessment of glaucoma severity: normal (0 ≤ CDR ≤ 0.5), moderate (0.5 ≤ CDR ≤ 0), and severely glaucomatous (0.8 ≤ CDR ≤ 1)

PNEUMONIA CLASSIFICATION SYSTEM: Independent research
Aug.2022-Present
- Developed a machine learning model that classifies X-ray images
- Classified 15,000 lung X-ray images data provided by three datasets into three results (pneumonia, COVID-19, and normal) using CNN

INVESTIGATION OF IMPAIRED INDIVIDUALS: Independent research
Nov. 2020-Apr. 2022
- "The Analysis and Improvement Direction of Convenience Facilities for the Impaired"
- Analyzed the current status and population trend of people with disabilities using a jupyter notebook with python and predicted the future trend (data science)

AWARDS AND HONORS

YOUTH INTERNATIONAL SCIENCE FAIR (YISF): Semi Grand Award
Mar. 2023
- IYSA Semi Grand Award/ IYSA Special Award/ Gold medal
- Annual science fair competition for students from around the world

USA COMPUTING OLYMPIAD (USACO): Gold Division
- Bronze level qualified: Dec, 2020/ Silver level qualified: Feb, 2022
- Annual computer programming competition for high school students in the United States

AMERICAN COMPUTER SCIENCE LEAGUE: Finalist
May. 2022
- competition focusing on developing problem-solving skills and computational thinking in students
- Contest examining for competitive programming skills

KOREAN ENGINEERING AND SCIENCE FAIR (KSEF): Gold medal
Jan. 2023
- annual science fair competition for Korean students
- Hosted by the Korean Federation of Science and Technology Societies