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Abstract

Leveraging 47 million heart ECG data for applications of healthcare AI inference models for inexpensive early heart disease screening

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Abstract:

Deep learning[1] has been widely used in digital surveillance, retail, manufacturing, smart city, and intelligent home applications to process video, image, voice, and text. With the availability of quality healthcare data, and the advancement of computing hardware, the healthcare industry is adopting deep learning in medical diagnostic devices and systems, such as Magnetic Resonance Imaging (MRI), Computer Tomography (CT), and Ultrasound, to enhance efficiency and accuracy of diagnostic workflows and ultimately reduce costs, while positively impacting patient outcomes.

Computer programs for ECG analysis and interpretation were introduced by various companies in the early 1970s and have become an essential tool for physicians over the last 50 years. Traditional diagnostic software is based on signal analysis of the morphology of P, QRS, and T waves. Clinical investigations indicate that the accuracy of these software diagnoses is relatively low. For example: • There are substantial rates of misdiagnosis by existing commercial ECG interpretation algorithms.[3] • Only about 50% of non-sinus rhythms were correctly inferred.[4] • Only one out of seven presentations of second degree AV block were correctly recognized.[4] These diagnostic errors have limited the adoption of traditional clinical computer-aided ECG interpretation. In research settings, convolutional neural networks (CNNs) or deep learning algorithms have been applied to ECG analysis research. But these research efforts have mostly focused on very limited diagnostic tasks, such as a handful of heartbeat types (e.g., normal, ventricular, or supraventricular ectopic) and rhythm diagnostics (e.g., commonly atrial fibrillation or ventricular tachycardia).

LEPU AI-ECG technology is a comprehensive deep learning based analysis pipeline that provides synchronous automatic interpretation of multi-lead raw ECG data. In 2018, LEPU AI-ECG became the first FDA 510(k)-cleared[4] and CE-certified ECG analysis software powered by AI in China (FDA 510(K): K180432; CE Certification: Q5 0500440 0027). With overall accuracy of 95%, LEPU AI-ECG's outstanding performance and accuracy makes it a vital and irreplaceable tool for clinical physicians compared to traditional ECG software.

Biography:

David Chung is the USA Head of Carewell Lepu Medical. A strategic partner of Intel Builders AI program. A patient turned AI technologist, an experienced manager with awareness of the application of digital technology in a range of sectors. David has worked in the healthcare IT sector since 2007, member of ALA, AHIMA leading strategic guidance on data backup, migration, business process outsource, reimbursement audit and workflow optimization.

Prior to Lepu Medical, he oversees millions of medical record data exchange in four States, responsible for $18M P&L as the technology transitioned into artificial intelligence processing. With diverse experience in the artificial intelligence legal services, he's keen on the possibility of AI.

David is responsible for the global adoption of AI-ECG. And has successfully launched USA's first AI-ECG enabled telemedicine platform, trained on 47 million patients heart ECG data.

Publication of speakers:

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