



An end-to-end system to automatically identify premalignant gastric conditions using artificial intelligence

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Experience:

<https://hmc.ntuh.gov.tw/our-team/cont?dept=02&no=007802>

Market Needs:

The mention of gastric cancer instills fear in everyone. Without early diagnosis, treatments such as surgery, chemotherapy, and targeted therapy often fall short of achieving a complete cure. In Taiwan, around one million people undergo gastroscopy examinations each year, in the hope of early detection and treatment. However, many individuals receive inconclusive results like "gastric inflammation," which lack objective and scientific assessments.

Our Technology:

This system comprises two main components. The first component involves three key steps. First, it classifies gastric endoscopic images into gastric and non-gastric regions. Second, it further divides the gastric regions into the pylorus, body, and antrum. Third, it enhances image contrast and assesses the severities of atrophic gastritis and intestinal metaplasia. In the actual test set, the model achieved accuracies of 0.886 for atrophic gastritis and 0.880 for intestinal metaplasia. The second component involves practical implementation using cloud computation. Gastroscopic images are transmitted from rural hospitals to the mobile PACE system, which then transfers these images to an AI computing center within the medical center for three-stage deep learning model computation. The results are subsequently sent back to the local mobile devices, displaying interpretive heatmaps and providing a comprehensive end-to-end service.

Strength:

Predicting the risk of gastric cancer traditionally necessitated specialized personnel to prepare and transport tissue samples for pathological diagnosis. However, with the advent of a deep learning system that replicates the expertise of gastroenterologists and pathologists, it can accurately predict the severity of precancerous lesions with nearly 90% accuracy, offering a convenient telemedicine service. This technology enables the precise allocation of limited resources, thereby making it an efficient and accessible option for enhancing healthcare in underserved regions.

Competing Products:

Currently, there are no competing products in the realm of conventional medical practice, which typically involves gastric endoscopy with biopsy and subsequent pathological examination, that can match the capabilities of this system.

Intellectual Properties:

We have filed a provisional patent in the United States and are now in the process of preparing to apply for the Taiwanese patent.

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