Artificial intelligence solution improves clinical trial recruitment

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Clinical trials are a critical tool for getting new treatments to people who need them, but research shows that difficulty finding the right volunteer subjects can undermine the effectiveness of these studies. Researchers at Cincinnati Children's Hospital Medical Center designed and tested a new computerized solution that used artificial intelligence (AI) to effectively identify eligible subjects from Electronic Health Records (EHRs), allowing busy clinical staff to focus their limited time on evaluating the highest quality candidates.

The study is published online in *JMIR Medical Informatics*. It shows that compared to manually screening EHRs to identify study candidates, the system—called the Automated Clinical Trial Eligibility Screener (ACTES)—reduced patient screening time by 34 percent and improved patient enrollment by 11.1 percent. The system also improved the number of patients screened by 14.7 percent and those approached by 11.1 percent.

Busy emergency departments often serve as excellent locations for clinical trial coordinators to find people who may be good study candidates. According to the study's lead investigator, Yizhao Ni, Ph.D., Division of Biomedical Informatics, ACTES is designed to streamline what often proves to be inefficient clinical trial recruiting process that doesn't always catch enough qualified candidates.

"Because of the large volume of data documented in EHRs, the recruiting processes used now to find relevant information are very labor

intensive within the short time frame needed," said Ni. "By leveraging natural language processing and machine learning technologies, ACTES was able to quickly analyze different types of data and automatically determine patients' suitability for clinical trials."

How it Works

The system has natural language processing, which allows computers to understand and interpret human language as the system analyzes large amounts of linguistic data. Machine learning allows computerized systems to automatically learn and evolve from experience without specifically being programmed. This makes it possible for computer programs to process data, extract information, and generate knowledge independently.

The automated system extracts structured information such as patient demographics and clinical assessments from EHRs. It also identifies unstructured information from clinical notes, including the patients' clinical conditions, symptoms, treatments and so forth. The extracted information is then matched with eligibility requirements to determine a subject's suitability for a specific clinical trial.

The system's machine learning component also allows it to learn from historical enrollments to improve its future recommendations, according to the researchers. Much of the analyses are handled by carefully designed AI algorithms, essentially procedures or formulas that computers use to solve problems by performing a set sequence of specified actions.

Advanced to Live Clinical Setting

Previously the system was successfully pilot tested in a retrospective

study published in 2015 by the *Journal of the American Medical Informatics Association*. The current study tested the solution prospectively and in real time in a busy emergency department environment, where clinical research coordinators recruited patients for six different pediatric clinical trials involving different diseases.

Using the technology in a live clinical environment involved significant collaboration between data scientists, application developers, information service technicians and the end users, clinical staff.

"Thanks to the institution's collaborative environment, we successfully incorporated different groups of experts in designing the integration process of this AI solution." Ni said.

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