MACHINE LEARNING INCREASES ACCURACY AND EFFICIENCY OF CLINICAL TRIAL DATA COLLECTION

RDSC helps physicians improve effectiveness of clinical trial with real time data verification, robust signal preprocessing and feature extraction.

PARTNER

URMC physicians

INDUSTRY

Healthcare

GOAL

Improve data collection and data analysis processes in clinical trials.

APPROACH

- Machine Learning

THE OPPORTUNITY

New treatments for myotonic muscular dystrophy, a genetic disorder whose symptoms include gradually worsening muscle loss and weakness, are being developed and evaluated in clinical trials. Successful clinical trials require efficient, high quality data collection and effective, reliable analysis of the patient's response to treatments. In the evaluation, a QMA device records the force of a hand squeeze on a spring. A set of handcrafted features extracted from these recordings is used to quantify symptom severity of myotonia, with and without treatment.

THE CHALLENGE

Previously, physicians were discovering periodic errors in data collection after patient visits, resulting in the corrupted data being rejected and requiring the patient to reschedule an additional visit. RDSC was asked to develop a data verification method that would reduce the errors in data collection and wasted patient visits.

RDSC also needed to develop a method of accounting for the warmup effect between the first and the fifth squeeze of the QMA device. The team had to improve signal pre-processing and develop state-of-the-art algorithms that would enable more accurate disease diagnosis.

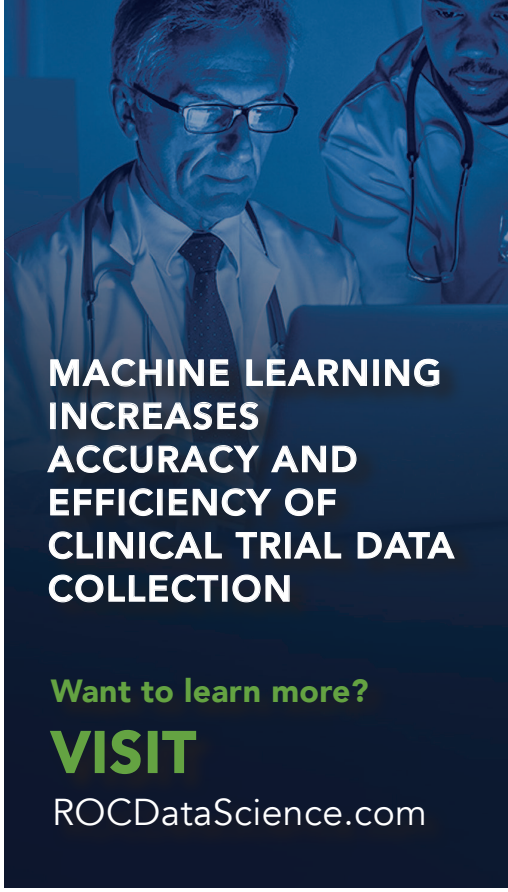
THE SOLUTION

RDSC applied its experience integrating signal, image and video processing with machine learning to develop a solution for improved disease diagnosis. Working closely with physicians, RDSC delivered the following:

- A new model for data quality verification that evaluates the quality of collected data so that any corrupted recordings can be rejected real time during data collection
- More robust signal preprocessing and feature extraction stages
- Deep learning algorithms that achieved 98% classification accuracy for patients vs. healthy controls
- 87% quantification accuracy of the warm-up effect between the first and fifth squeezes
- A discovery of a reverse warm-up effect between trials within each visit

RESULTS

1. The quality-verification module reduces the frequency at which a trial is wasted and/or a patient must be brought back due to mistakes in data collection.
2. The improved robustness of pre-processing and processing stages allows better feature extraction in the presence of noise.
3. The deep learning algorithms discovered new insights that lead to improved efficiency in data collection in clinical trials.



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