

機械学習による急性脳主幹動脈閉塞症の予測精度の向上とアプリケーションの操作性改善

佐藤孝治¹ 林昌純² 清元佑紀³ 重田恵吾⁴ 松本省二⁵ 小山裕司¹

概要: 本研究は機械学習技術を用いて急性脳主幹動脈閉塞症の予測精度を向上, ならびにアプリケーションの操作性を改善する試みである. 先の研究で我々は機械学習による ELVO 予測アプリケーションを開発し, 感度 75%, 偽陰性率 25%であった. 今回の実装では, 1. ELVO 症例数の追加 (86 症例), 2. 拡張期血圧を連続値から 10 刻みへ変更, 3. 年齢を連続値から離散値へ変更, 4. 決定木の深さを調整, 5. クラスの重みを調整, 6. 決定木の数の変更を試行し, それぞれ比較した. その結果, 1, 3, 5 が有効であることを特定し, 感度 93.1%, 偽陰性率 6.9%を実現した. また, 2 の変更は感度と偽陰性率の向上には寄与しないがアプリケーションの操作性を改善できるため採用した.

キーワード: 機械学習, 急性脳主幹動脈閉塞症, アプリケーションユーザビリティ

Improving the prediction accuracy of Emergent Large Vessel Occlusion (ELVO) by machine learning and improving the usability of the application

Takaharu Sato^{†1} Masazumi Hayashi^{†2} Yuki Kiyomoto^{†3}
Keigo Shigeta^{†4} Shoji Matsumoto^{†5} Hiroshi Koyama^{†1}

Abstract: This study is an attempt to improve the prediction level of Emergent Large Vessel Occlusion (ELVO) by machine learning methods and the usability of the application, called ELVO checker. In our previous result, we developed a machine learning-based ELVO prediction application with a sensitivity of 75% and a false negative rate of 25%. In this paper, we attempted (1) to add ELVO 86 cases, (2) to change the diastolic blood pressure from continuous to 10 increments, (3) to change the age from continuous to discrete, (4) to adjust the maximum depth of decision trees (5) to adjust the class weights, and (6) to change the number of decision trees, and compared these results. As a result, we found the change 1, 3, and 5 were effective and obtained a sensitivity of 93.1% and a false negative rate of 6.9%. The change 2 was not effective, but was adopted since it was expected to improve the usability of the application.

Keywords: Machine Learning, Emergent Large Vessel Occlusion, Application Usability

1 東京都立産業技術大学院大学産業技術研究科
Graduate School of Industrial Technology, Advanced Institute of Industrial Technology
2 法政大学理工学部応用情報工学科
Department of Applied Informatics, Faculty of Science and Engineering, Hosei University
3 独立行政法人国立病院機構災害医療センター臨床初期研修医
Junior resident, National Hospital Organization Disaster Medical Center
4 独立行政法人国立病院機構災害医療センター脳神経外科
Department of Neurosurgery, National Hospital Organization Disaster Medical Center
5 藤田医科大学医学部脳卒中科
Department of Comprehensive Strokeology, School of Medicine, Fujita Health University