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Optimization algorithm in machine learning for telemedicine rehabilitation models in brain injury care

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Introduction: Machine learning and artificial intelligence are significant areas of interest in both contemporary science and medical care. The algorithm's speed depends on the size of the dataset, the number of model parameters, and the number of iterations. Standard gradient descent requires computing the gradient of the cost function over the entire dataset, which can be resource-intensive, especially with large datasets. The algorithm selects a smaller learning rate for frequently updated parameters and a larger one for parameters corresponding to rare features.

Objective: To make sure our model works well for our specific needs, we create a telemedicine model for rehabilitation of patients with upper limb injuries as part of brain injuries.

Materials and Methods: This study analyzed medical records from two groups of patients. The retrospective group included 186 cases of upper limb injuries associated with brain injuries. The main group comprised 62 patients who underwent additional rehabilitation using the AI telemedicine model. To evaluate the effectiveness and versatility of the AI model, comparisons were made with a traditional rehabilitation group.

Results: The results appear promising, with the model achieving an accuracy of 97%, meaning it correctly predicted 97 out of 100 adverse event during telerhabilitation. This level of accuracy suggests that the model is performing well on our telerehabilitation model, demonstrating its effectiveness in predicting such complications as pain, edema, and raising of local temperature. Use of the proposed algorithm is capable of achieving good results across a wide range of machine learning tasks. The AI-based telemedicine model, allowing real-time monitoring, led to better functional recovery and reduced use of medical services compared to traditional methods. Analysis of the results conducted on various datasets indicates a significant advantage of the AI telemedicine optimization algorithm.

Conclusions: The use of AI-based telemedicine technologies can assist a larger number of patients by enabling telerehabilitation in remote areas. Experiments on various datasets demonstrated that the AI telemedicine algorithm is capable of achieving excellent results across a wide range of machine learning tasks in healthcare.

Keywords: AI; brain injuries; upper limb; telerehabilitation model.

Biography

Oles Hospodarskyy is a prominent academic and researcher at Lviv Polytechnic National University in Ukraine. With a deep commitment to advancing education and research, Oles has made significant contributions to his field. His work at Lviv Polytechnic National University encompasses various innovative projects and studies, reflecting his dedication to excellence and his passion for pushing the boundaries of knowledge. Oles Hospodarskyy continues to inspire students and colleagues alike with his expertise and unwavering dedication to academia.