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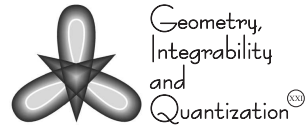

COMPARATIVE EVALUATION OF VARIOUS ACTIVATION FUNCTIONS IN THE RECURRENT NEURONS OF THE LRPNN

NIKOLAY DUKOV and TODOR GANCHEV

Department of Computer Science and Engineering, Technical University of Varna
1 Studentska Str., 9010 Varna, Bulgaria

Abstract. In the present work, we investigate the behavior of the Locally Recurrent Probabilistic Neural Network (LRPNN) with different activation functions in the recurrent layer neurons. Specifically, we evaluate the performance of the modified activation function proposed here, which belongs to the family of Rectified Linear Units (ReLU), and compare it with other ReLU-based functions, the traditional sigmoid activation function, as well as with the Swish and E-Swish activation functions. Furthermore, we investigate the efficiency of a training procedure which simultaneously adjusts the spread factor sigma and the weights in the recurrent layer of the LRPNN. This training helps for coping with practical tasks, such as the recognition of Parkinson condition from speech signals, which operate under limited amount of training data.

MSC: 68T01, 92B20, 92C50
Keywords: LRPNN, neural networks, Parkinson speech dataset, ReLU, RNN

1. Introduction

Wearable medical monitors and other portable devices can benefit from the automated detection of events and conditions with diagnostic significance. Such a functionality could be especially important for people who live on their own and suffer from diseases that cause life-threatening conditions, or when the progress of a disease needs to be monitored closely. Wearable and portable devices require prolonged autonomy and forces many of the algorithms to be implemented in custom hardware that can be attached to the body or integrated in the clothing.

Some data modeling methods are more appropriate for hardware implementation and integration in clothing than others. This is because many of the contemporary