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RECOGNIZING PATHOGENIC ANTIBODIES IN SLE USING GENERAL REGRESSION NEURAL NETWORKS

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Abstract. *In this paper, a new method, based on artificial neural networks (ANN), has been introduced for recognizing pathogenic antibodies in Systemic Lupus Erythmatosus (SLE). dsDNA binding antibodies have been implicated in the pathogenesis of this autoimmune disease. In order to identify these dsDNA binding antibodies, the protein sequences of 42 dsDNA binding and 608 non-dsDNA binding antibodies were extracted from Kabat database and coded using five different physicochemical properties of their amino acids. Coded antibodies were used as the training patterns for five parallel general regression neural networks (GRNNs). Comparing the results obtained by the proposed method with other published results shows the efficacy of proposed approach.*
Keywords: Anti-dsDNA, Antibody, General regression neural network, Systemic lupus erythematosus, Physicochemical properties

1. **Introduction.** Systemic Lupus Erythematosus (SLE or 'lupus') is a major autoimmune rheumatic disease where autoantibodies are frequently targeted against intracellular antigens of the cell nucleus (double and single stranded DNA) [1]. Unfortunately, the cause of lupus is unknown. The Lupus Foundation of America estimates that approximately one million Americans have SLE [2]. Lupus can occur at any age and in either sex, although it is more common in women of childbearing ages [3]. SLE can affect almost any organ or system of the body. In most cases, the disease affects the kidneys, lungs and central nervous system. Infection, lupus flares and cardiovascular disease are cause of most deaths [1,4]. In general, people suffering from SLE have periods of illness and wellness with varying signs. Some have just a few signs of the disease while others have more. This variation in clinical characteristics has made diagnosis of SLE very challenging. According to the result of an experiment on more than five million U.S. Armed Forces personnel, in 115 of the 130 patients with SLE (88 percent), at least one SLE autoantibody tested was