

## Introduction to Optimization

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### Introduction

Our aim is to apply Particle Swarm Optimization to the design of a one-hidden-layer neural network with the input coming from the heart disease data set, which comprises a number of attributes related to the heart and a target variable that indicates if a patient has a case of heart disease.

### Neural Network Structure

The structure of the neural network used in this study is as follows:

- Number of inputs (features): 11
- Number of hidden neurons: 5
- Number of output classes: 2

### PSO Implementation

The PSO algorithm using implementation available within PySwarm library. The values for the hyperparameters in the PSO implementation are set as:

- Cognitive parameter ( $c1$ ): 0.5
- Social parameter ( $c2$ ): 0.3
- Inertia weight ( $w$ ): 0.9

### Results

The final result was obtained by running the PSO algorithm and due to the PSO algorithm being stochastic, the accuracy will differ with each run.