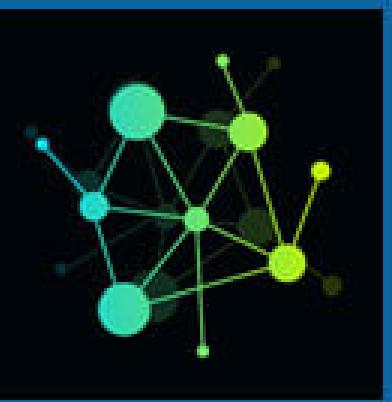


FUSION OF SOFT COMPUTING AND HARD COMPUTING IN INDUSTRIAL APPLICATION

PRESENTED BY GROUP 11
THAKDANAI CHAIYASEN 62070502209
PETE RANGSICHAMRAS 62070502215
PORANAT WONGDEE 62070502232

WHAT IS SOFT AND HARD COMPUTING ?



Soft Computing



Hard Computing

vs

•WHAT'S THE DIFFERENCE?•

TASK	PURE HARD COMPUTING PROBLEMS	PURE SOFT COMPUTING PROBLEMS
CONTROL	<ul style="list-style-type: none"> LINEAR CONTROLLER IS OPTIMAL ONLY AT ONE OPERATION POINT OF A NONLINEAR SYSTEM 	<ul style="list-style-type: none"> UNPREDICTABLE BEHAVIOR AND STABILITY OF FL AND NN-BASED CONTROLLERS
OPTIMIZATION	<ul style="list-style-type: none"> GRADIENT – BASE ALGORITHM GETS EASILY STOCK AT LOCAL MINIMAL GRADIENT INFORMATION MAY NOT BE AVAILABLE 	<ul style="list-style-type: none"> TIME-CONSUMING OPTIMIZATION PROCESS WITH GA
FAULT DIAGNOSIS	<ul style="list-style-type: none"> DIFFICULT TO FIND RULES TO GOVERN A SYSTEM WITH MULTIPLE INPUTS AND MULTIPLE OUTPUTS 	<ul style="list-style-type: none"> DIFFICULT TO USE POSSIBLY AVAILABLE INFORMATION OF PHYSICAL MODELS, I.E, TRANSFER FUNCTION

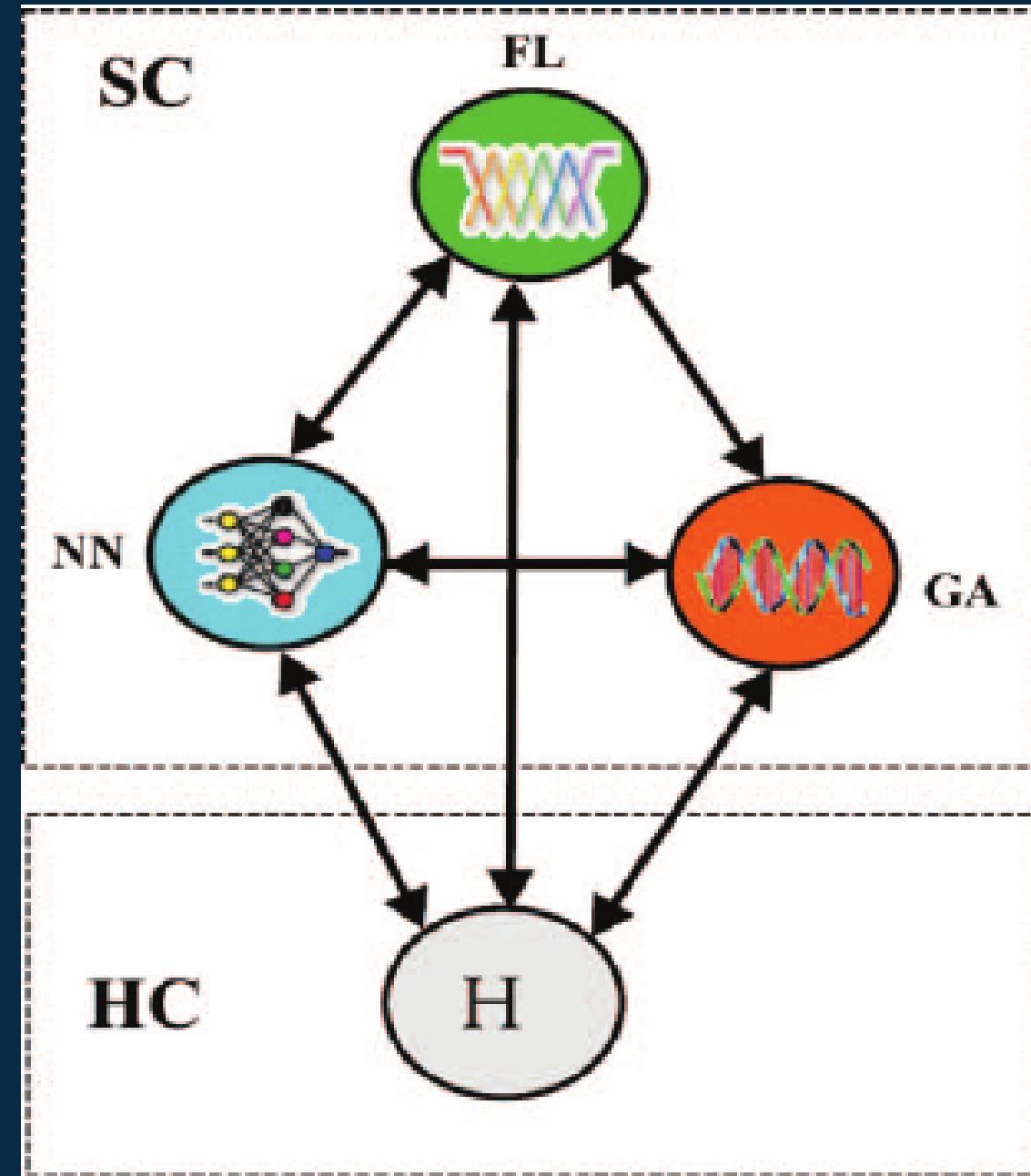
•WHAT'S THE DIFFERENCE?•

TASK	POSSIBLE SOLUTIONS FOR HARD COMPUTING	POSSIBLE SOLUTION FOR SOFT COMPUTING
CONTROL	SC-BASED ON-LINE TUNING OF CONTROLLER PARAMETER	LINEAR CONTROLLER WITH SC- BASED GAIN SCHEDULING
OPTIMIZATION	GA-BASED OPTIMIZATION MORE PROBABLY FINDS THE GLOBAL MINIMUM GRADIENT INFORMATION IS NOT NEEDED	GLOBAL SEARCH BY GA AND FURTHER LOCAL SEARCH BY SOME CONVENTIONAL ALGORITHM
FAULT DIAGNOSIS	HUMAN-LIKE PERCEPTION POSSIBLE WITH NEURAL NETWORKS AND FUZZY LOGIC	SC-BASED POST PROCESSING OF NUMERICAL AND LINGUISTIC INTERMEDIATE RESULT AND RAW DATA

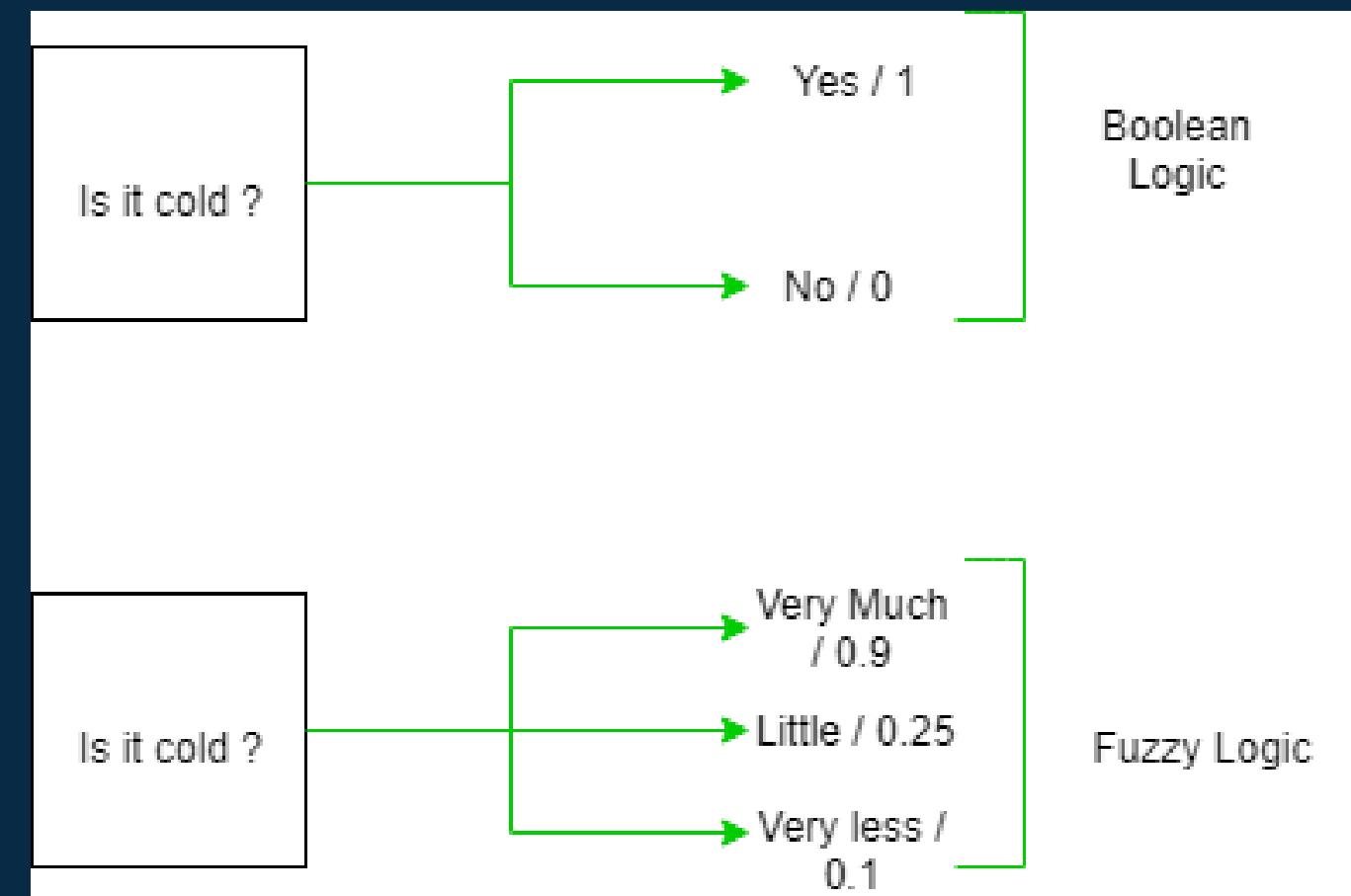
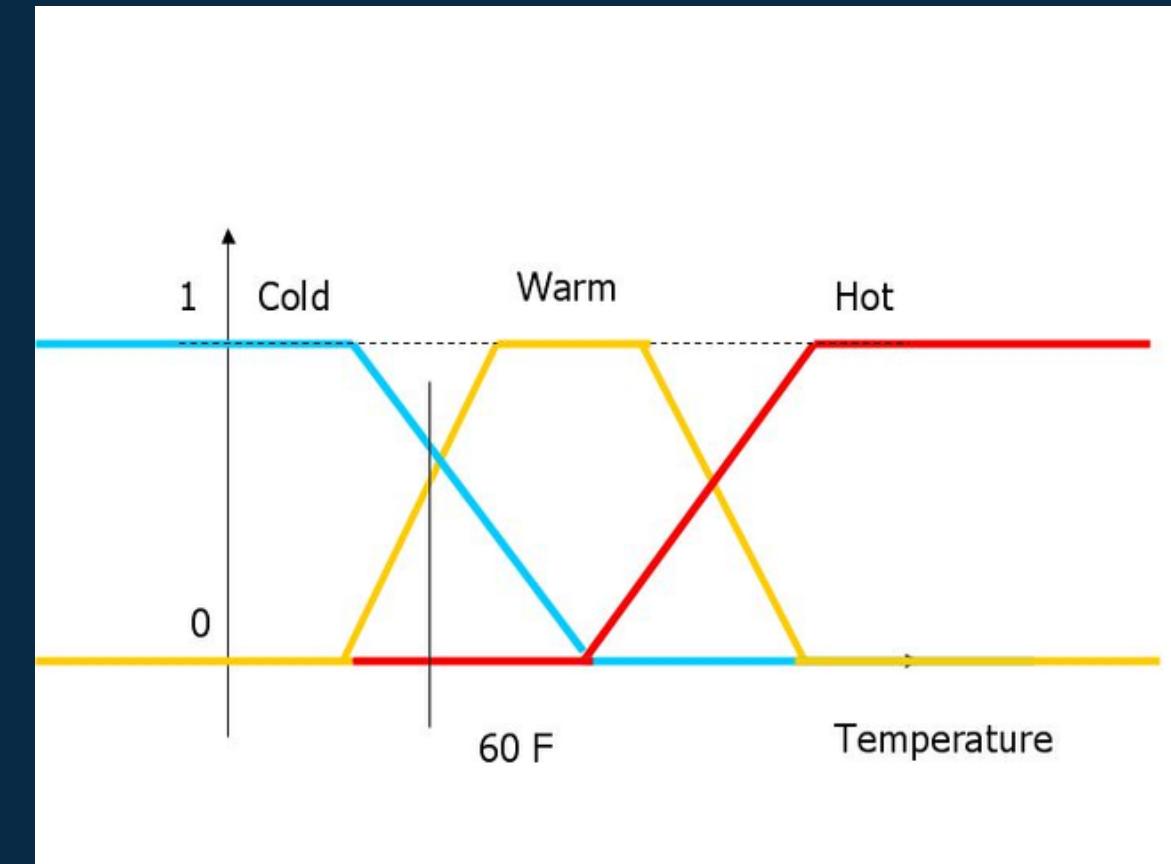
WHY FUSING SC AND HC IS SOLUTION ?

In fusion of SC and HC, the role between difference methodologies should be assigned based on their individual advantages and disadvantages. SC aims to exploit tolerance for imprecision, uncertainty and partial truth to achieve robustness, tractability, and low total cost. In contrast, HC techniques are typically the result of months or years of development to solve specific classes of problems and, as a result of months or years of development to solve problem and get more numerical stability. Because of these different properties the integration of SC and HC could potentially tackle problems that cannot be solved satisfactorily by either methodology on its own

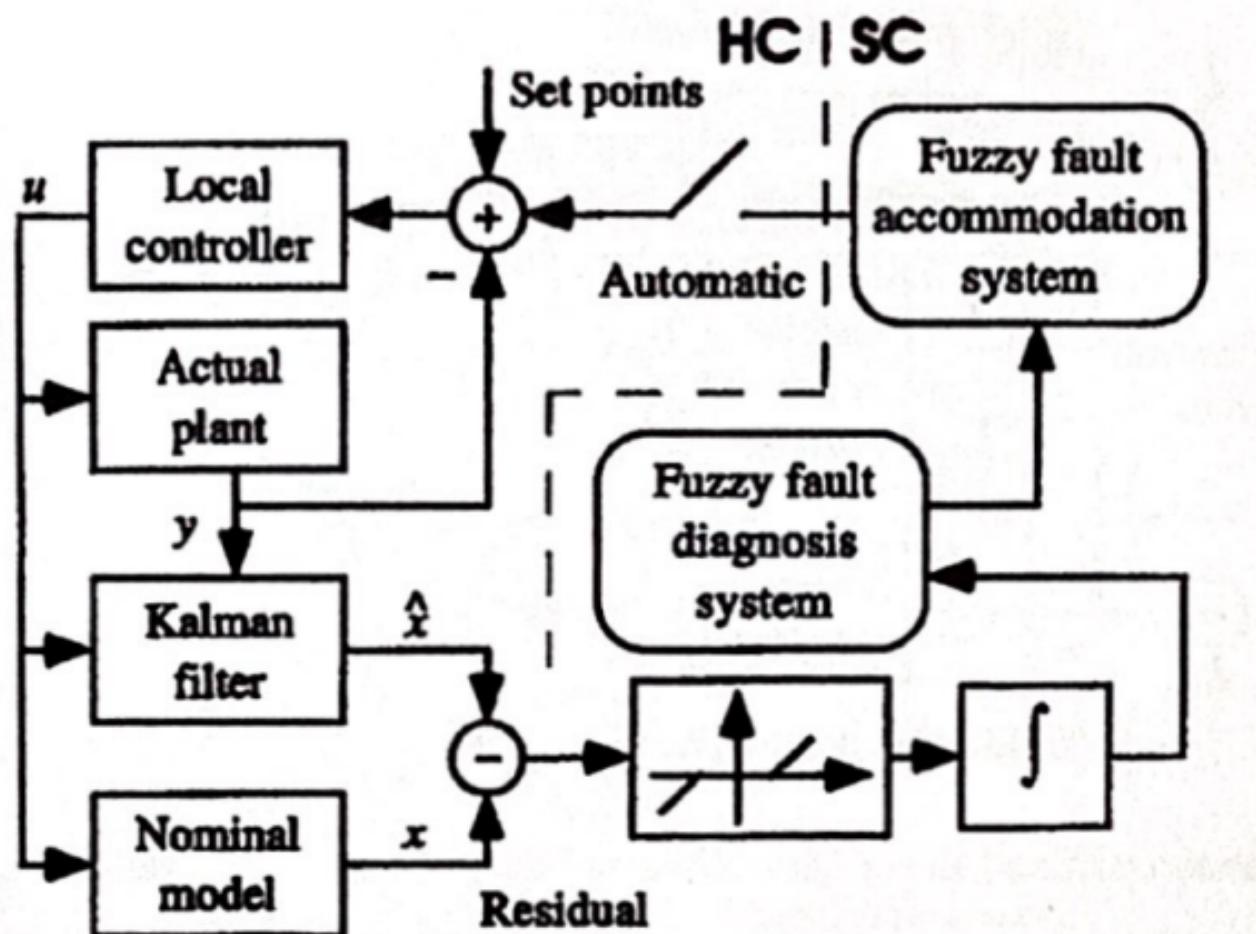
FUSION OF SOFT COMPUTING AND HARD COMPUTING



FUZZY LOGIC AND HARD COMPUTING

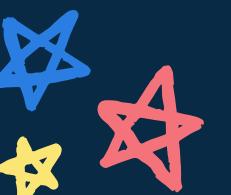
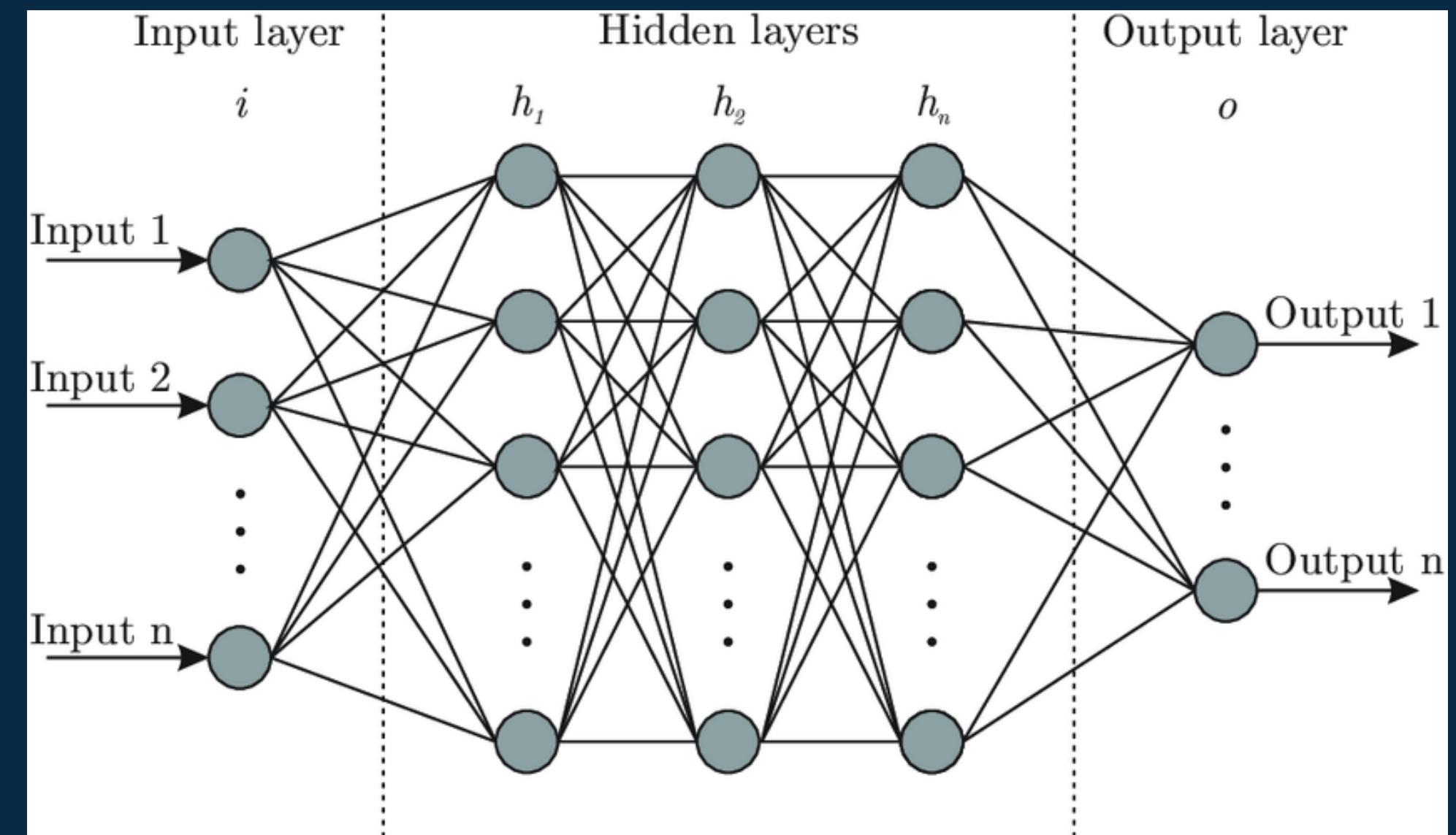


EXAMPLE OF FUZZY AND HARD COMPUTING

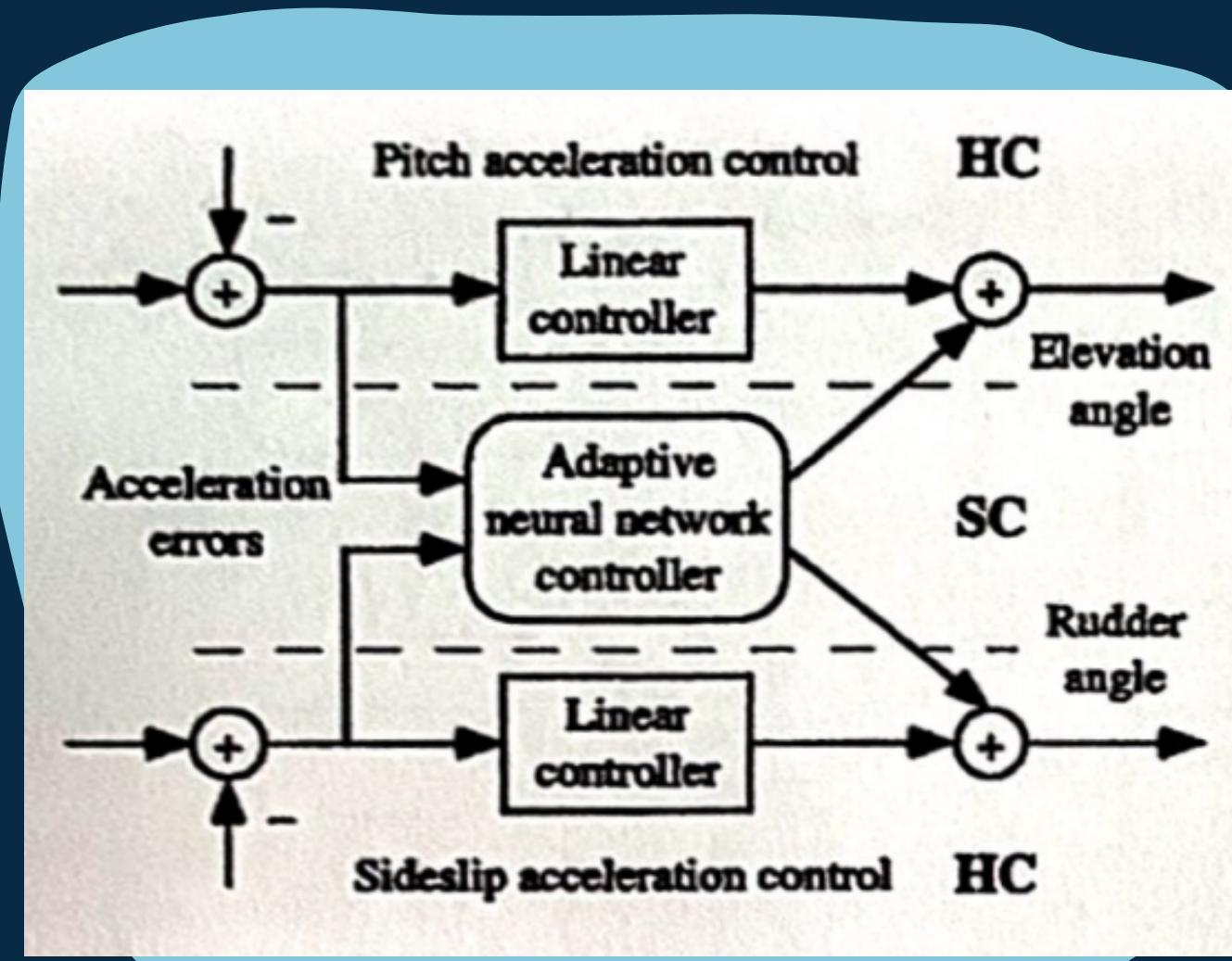


FUNCTIONAL BLOCK DIAGRAM FOR
FAULT DIAGNOSIS OF BOILER
TURBINE SYSTEM

NEURAL NETWORKS AND HARD COMPUTING

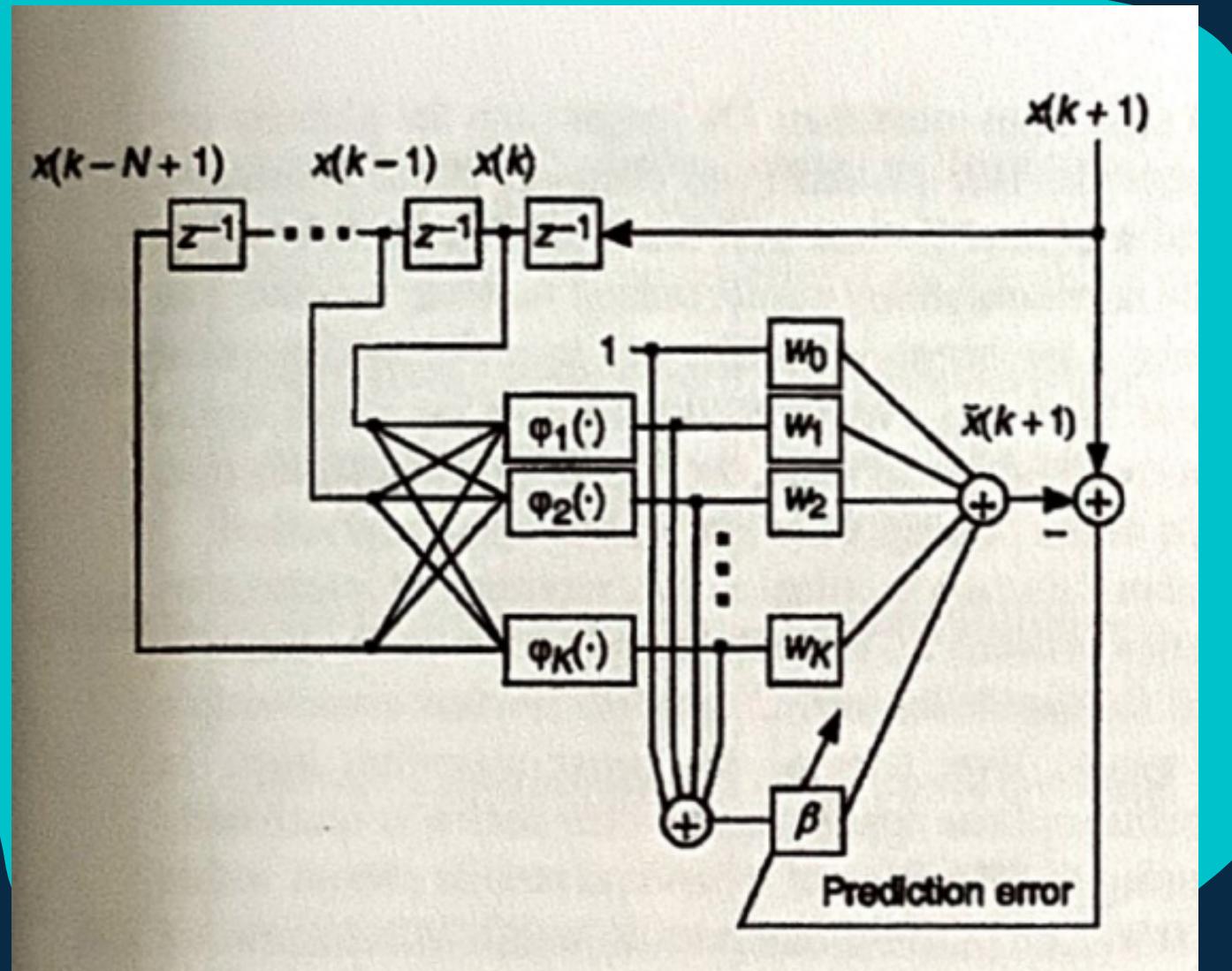


EXAMPLE OF NEURAL NETWORKS AND HARD COMPUTING



Combination of fixed linear controllers and adaptive neuro controller

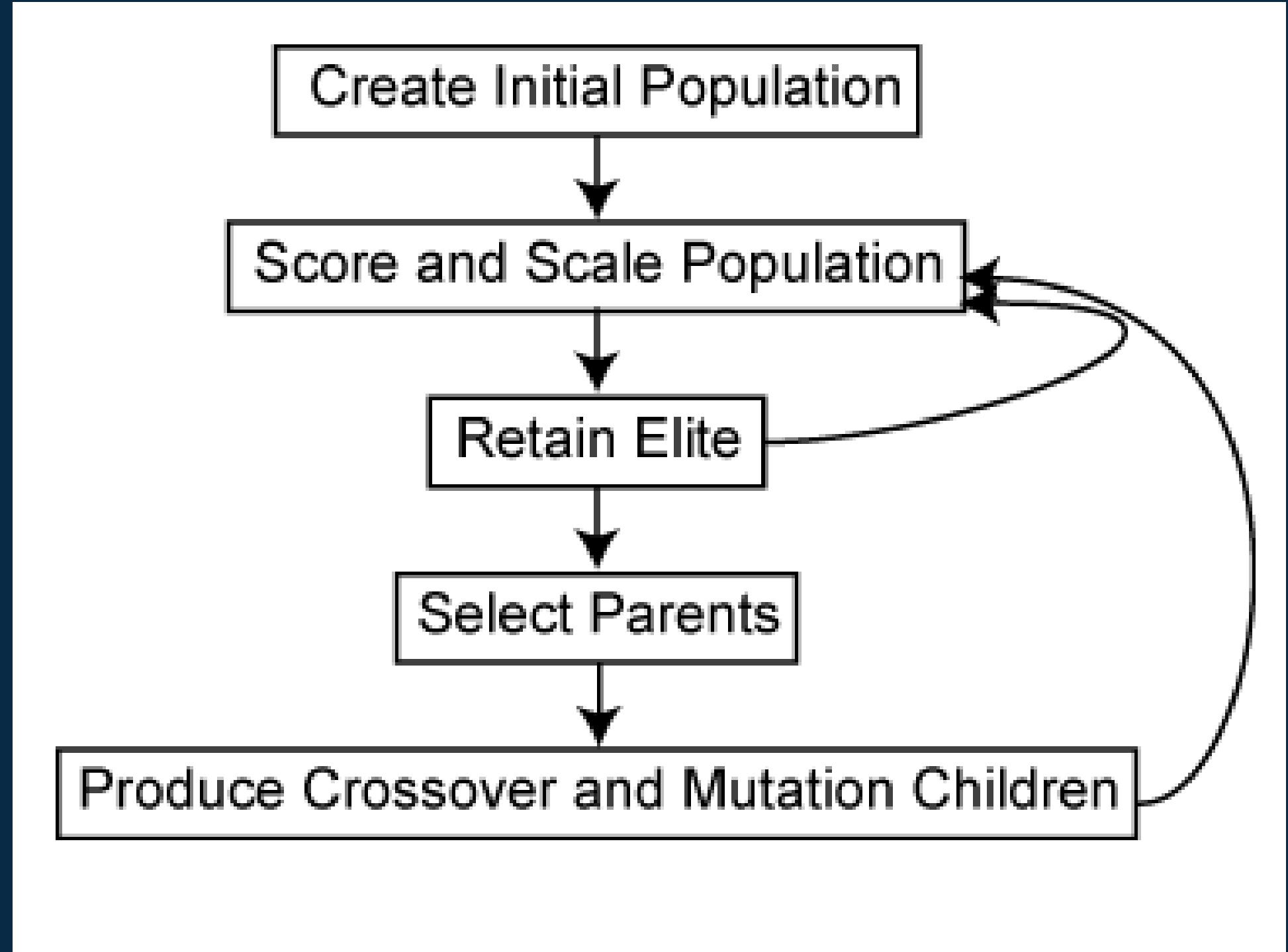
EXAMPLE OF NEURAL NETWORKS AND HARD COMPUTING



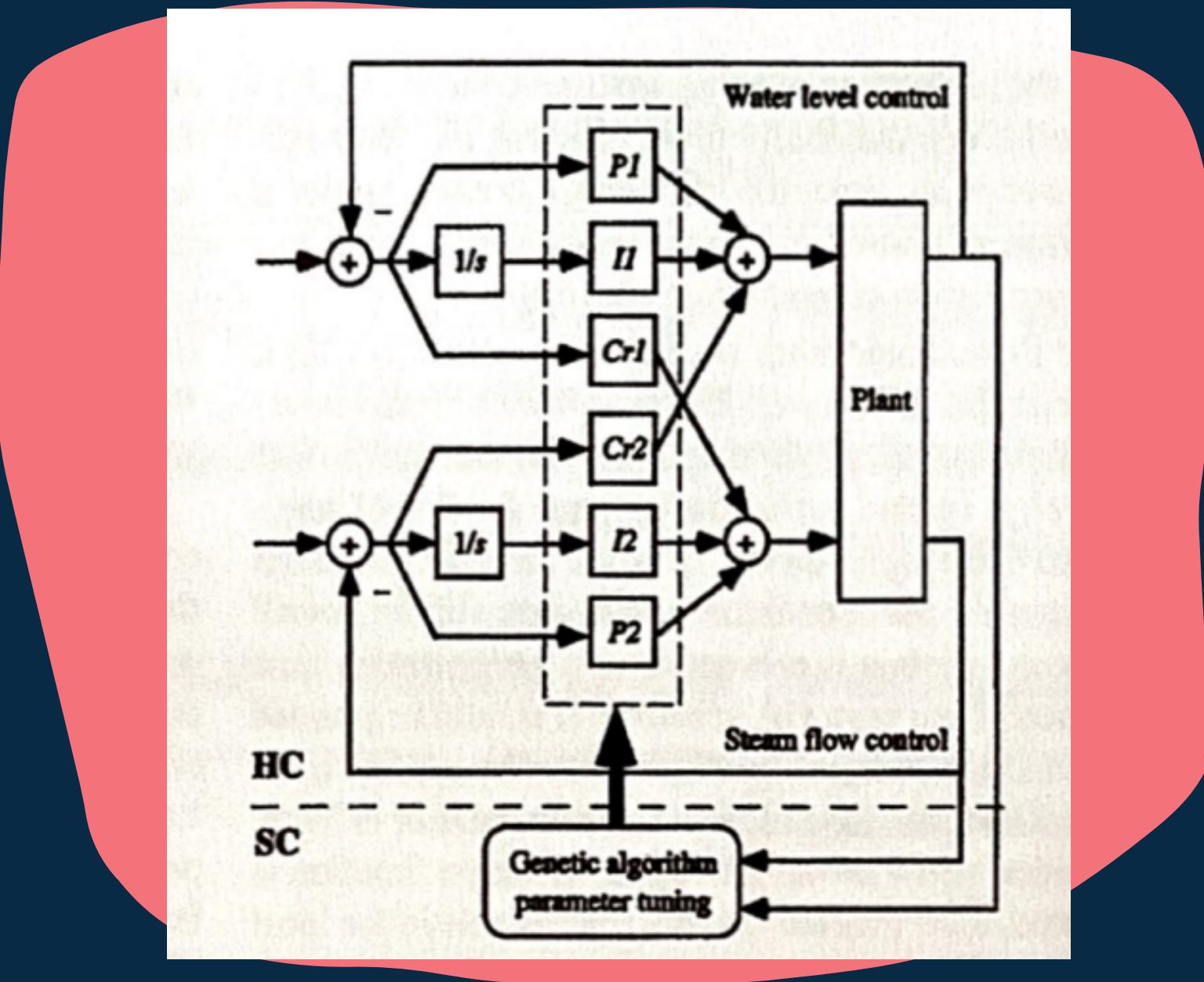
General parameter RBF network
for time-series prediction

CS

GENETIC ALGORITHMS AND HARD COMPUTING



EXAMPLE OF GENETIC ALGORITHMS AND HARD COMPUTING



GA-based feedback control
scheme for steam generator
system

OTHER SC AND HC COMBINATIONS



CONCLUSION

WE PRESENTED AN OVERVIEW OF THE FUSION OF HARD COMPUTING AND SOFT COMPUTING AND THE CONCLUSION THAT HC TECHNIQUES AND THE EMERGING SC SHOULD BE SEEN AS COMPLEMENTARY METHODOLOGIES BOTH TECHNOLOGIES ARE NEEDED WHEN DEVELOPING HIGH-PERFORMANCE ROBUST AND COST-EFFECTIVE PRODUCTS IN THIS DEMANDING TECHNOLOGICAL AGE





Thank
you!!!