

# **ARTIFICIAL NEURAL NETWORK UNIVERSITY OF APPROACHES FOR PERMEABILITY ESTIMATION**

## SUPPORT VECTOR MACHINE (SVM) VS. GENERAL REGRESSION NEURAL NETWROK (GRNN)

#### INTRODUCTION

Permeability is a critical to measure and a vital criterion to determine the quality and characteristics of aquifer. Artificial Neural Networks (ANNs) and their application in hydrogeology shown to be an effective tool to manage nonlinear complex problems especially when there are no straightforward analytical or even numerical solutions. ANN model occurs utilizing basic units of processing which are artificial network of neurons connected to each other (Rosenblatt, 1958).

**DEBRECEN** 

## METHODOLOGY

Volve field is located at the central part of North Sea, with 80 meters of water depth which is considered as shallow water. The chosen well is 15/9-19 BT2, with 132 core data. The main reservoir belongs to Hugin Formation (Szydlik et al., 2007), it is sandstones at depth of 2750–3120 meters TVDss, it is a dome structure and small in size which formed by the adjacent downfallen salt ridges of middle Jurassic. SVMs are learning algorithms which may be used to overcome nonlinear regressions by the use of kernel functions (Vapnik, 1999). Dataset of  $(y_k, x_k)$  with N given training points where  $y_k$  represents the output at variable inputs which explicated with x<sub>k</sub> vector, input and output relationship has the following function

where  $x_k$  is input vector, w is the vector of weights, T is the symbol of transpose and b is the bias. Results of SVMs were obtained to verify the precision of the SVM in the estimation of permeability. GRNN is a multilayer neural network with one hidden layer and only one neuron of the output layer. Multilayers with nonlinear assigned functions grant the network to master nonlinear and linear input-output accord.

This presentation participates in **OSPP** 



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**RESULTS** 



### Permeability estimation by Support Vector Machine.

# CONCLUSION

SVR method has a rapid run with a small portion of time and shows more accuracy. According to geological parameters of each zone of the aquifer, the designing of individual networks is more authentic than a single network for all zones. The qualified SVM will be monitored for recommendation and future endeavors.

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 $f(x_k)=w^{T*}x_k+b$ ,



#### Permeability estimation by General Regression Neural Network.

### **REFERENCES**

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