Selected Function List from Neural Network Toolbox For Use with MATLAB®

User's Guide

Version 4

Function Reference

Analysis Functions

- Errsurf: Error surface of a single input neuron.
- Maxlinlr: Maximum learning rate for a linear neuron.

Distance Functions

- Boxdist: Distance between two position vectors.
- Dist: Euclidean distance weight function.
- Linkdist: Link distance function.
- Mandist: Manhattan distance weight function.

Graphical Interface Function

- Nntool: Neural Network Tool - Graphical User Interface.

Function Reference

Layer Initialization Functions

- Initnw: Nguyen-Widrow layer initialization function.
- Initwb: By-weight-and-bias layer initialization function.

Learning Functions

- Learncon: Conscience bias learning function.
- Learngd: Gradient descent weight/bias learning function.
- Learngdm: Grad. descent w/momentum weight/bias learning function.
- Learnh: Hebb weight learning function.
- Learnhd: Hebb with decay weight learning rule.
- Learnis: Instar weight learning function.

Function Reference

Learning Functions

- Learnk: Kohonen weight learning function.
- Learnlv1: LVQ1 weight learning function.
- Learnlv2: LVQ2 weight learning function.
- Learnos: Outstar weight learning function.
- Learnp: Perceptron weight and bias learning function.
- Learnpn: Normalized perceptron weight and bias learning function.
- Learnsom: Self-organizing map weight learning function.
- Learnwh: Widrow-Hoff weight and bias learning rule.

Line Search Functions

- Srchbac: One-dim. minimization using backtracking search.
- Srchbre: One-dim. interval location using Brent's method.

Function Reference

Line Search Functions (Con.)

- Srchcha: One-dim. minimization using Charalambous' method.
- Srchgol: One-dim. minimization using Golden section search.
- Srchhyb: One-dim. minimization using Hybrid bisection/cubic search.

Net Input Derivative Functions

- Dnetprod: Product net input derivative function.
- Dnetsum: Sum net input derivative function.

Net Input Functions

- Netprod: Product net input function.
- Netsum: Sum net input function.

Function Reference

Network Initialization Functions

- Initlay: Layer-by-layer network initialization function.

Network Use Functions

- Adapt: Allow a neural network to adapt.
- Disp: Display a neural network's properties.
- Display: Display a neural network variable’s name and properties.
- Init: Initialize a neural network.
- Sim: Simulate a neural network.
- Train: Train a neural network.

Function Reference

New Networks Functions

- Network: Create a custom neural network.
- Newc: Create a competitive layer.
- Newcf: Create a cascade-forward backpropagation network.
- Newelm: Create an Elman backpropagation network.
- Newff: Create a feed-forward backpropagation network.
- Newfftd: Create a feed-forward input-delay backprop network.
- Newgrnn: Design a generalized regression neural network.
- Newhop: Create a Hopfield recurrent network.
- Newlin: Create a linear layer.
- Newlind: Design a linear layer.
- Newlvq: Create a learning vector quantization network

Function Reference

- Newp: Create a perceptron.
- Newpnn: Design a probabilistic neural network.
- Newrb: Design a radial basis network.
- Newrbe: Design an exact radial basis network.
- Newsom: Create a self-organizing map.

- **Performance Derivative Functions**
- Dmae: Mean absolute error performance derivative function.
- Dmse: Mean squared error performance derivatives function.
- Dmsereg: Mean squared error w/reg performance derivative function.
- Dsse: Sum squared error performance derivative function.

Function Reference

Performance Functions

- Mae: Mean absolute error performance function.
- Mse: Mean squared error performance function.
- Msereg: Mean squared error w/reg performance function.
- Sse: Sum squared error performance function.

Plotting Functions

- Hintonw: Hinton graph of weight matrix.
- Hintonwb: Hinton graph of weight matrix and bias vector.
- Plotbr: Plot network perf. for Bayesian regularization training.
- Plotep: Plot weight and bias position on error surface.
- Plotes: Plot error surface of single input neuron.

Function Reference

Plotting Functions (Con.)

- Plotpc: Plot classification line on perceptron vector plot.
- Plotperf: Plot network performance.
- Plotpv: Plot perceptron input target vectors.
- Plot: perceptron input target vectors.
- Plotsom: Plot self-organizing map.
- Plotv: Plot vectors as lines from the origin.
- Plotvec: Plot vectors with different colors.

Pre and Post Processing Functions

- Postmnmx: Unnormalize data which has been norm. by prenmmx.
- Postreg: Postprocess network response w. linear regression analysis.

Function Reference

Pre and Post Processing Functions (Con.)

- Poststd: Unnormalize data which has been normalized by prestd.
- Premnmx: Normalize data for maximum of 1 and minimum of -1.
- Prepca: Principal component analysis on input data.
- Prestd: Normalize data for unity standard deviation and zero mean.
- Tramnmx: Transform data with precalculated minimum and max.
- Trapca: Transform data with PCA matrix computed by prepca.
- Trastd: Transform data with precalc. mean & standard deviation.

Function Reference

Simulink Support Function

- Gensim: Generate a Simulink block for neural network simulation.

Topology Functions

- Gridtop: Gridtop layer topology function.
- Hextop: Hexagonal layer topology function.
- Randtop: Random layer topology function.

Training Functions

- Trainb: Batch training with weight and bias learning rules.
- Trainbfg: BFGS quasi-Newton backpropagation.
- Trainbr: Bayesian regularization.
- Trainc: Cyclical order incremental update.
- Traincgb: Powell-Beale conjugate gradient backpropagation.

Function Reference

Training Functions

- Traincgf: Fletcher-Powell conjugate gradient backpropagation.
- Traincgp: Polak-Ribiere conjugate gradient backpropagation.
- Traingd: Gradient descent backpropagation.
- Traingda: Gradient descent with adaptive lr backpropagation.
- Traingdm: Gradient descent with momentum backpropagation.
- Traingdx: Gradient descent with momentum & adaptive lr backprop.
- Trainlm: Levenberg-Marquardt backpropagation.
- Trainoss: One step secant backpropagation.
- Trainr: Random order incremental update.

Function Reference

Training Functions (Con.)

- Trainrp: Resilient backpropagation (Rprop).
- Trains: Sequential order incremental update.
- Trainscg: Scaled conjugate gradient backpropagation.

Transfer Derivative Functions

- Dhardlim: Hard limit transfer derivative function.
- Dhardlms: Symmetric hard limit transfer derivative function.
- Dlogsig: Log sigmoid transfer derivative function.
- Dposlin: Positive linear transfer derivative function.
- Dpurelin: Linear transfer derivative function.
- Dradbas: Radial basis transfer derivative function.

Function Reference

Transfer Derivative Functions (Con.)

- Dsatlin: Saturating linear transfer derivative function.
- Dsatlins: Symmetric saturating linear transfer derivative function.
- Dtansig: Hyperbolic tangent sigmoid transfer derivative function.
- Dtribas: Triangular basis transfer derivative function.

Transfer Functions

- Compet: Competitive transfer function.
- Hardlim: Hard limit transfer function.
- Hardlims: Symmetric hard limit transfer function.

Function Reference

Transfer Functions (Con.)

- Logsig: Log sigmoid transfer function.
- Poslin: Positive linear transfer function.

Training Functions

- Purelin: Hard limit transfer function.
- Radbas: Radial basis transfer function.
- Satlin: Saturating linear transfer function.
- Satlins: Symmetric saturating linear transfer function.
- Softmax: Softmax transfer function.
- Tansig: Hyperbolic tangent sigmoid transfer function.
- Tribas: Triangular basis transfer function.

Utility Functions

- Calca: Calculate network outputs and other signals.
- Calca1: Calculate network signals for one time step.

Function Reference

Utility Functions (Con.)

- Calce: Calculate layer errors.
- Calce1: Calculate layer errors for one time step.
- Calcgx: Calc. weight and bias perform. gradient as a single vector.
- Calcjejj: Calculate Jacobian performance vector.
- Calcjx: Calculate weight and bias performance Jacobian as a single matrix.
- Calcpd: Calculate delayed network inputs.
- Calcperf: Calculation network outputs, signals, and performance.
- Formx: Form bias and weights into single vector.
- Getx: Get all network weight and bias values as a single vector.

Function Reference

- Setx: Set all network weight and bias values with a single vector.

Vector Functions

- Cell2mat: Combine a cell array of matrices into one matrix.
- Combvec: Create all combinations of vectors.
- Con2seq: Converts concurrent vectors to sequential vectors.
- Concur: Create concurrent bias vectors.
- Ind2vec: Convert indices to vectors.
- Mat2cell: Break matrix up into cell array of matrices.
- Minmax: Ranges of matrix rows.
- Normc: Normalize columns of matrix.
- Normr: Normalize rows of matrix.
- Pnormc: Pseudo-normalize columns of matrix.

Function Reference

- Quant: Discretize value as multiples of a quantity.
- Seq2con: Convert sequential vectors to concurrent vectors.
- Sumsqr: Sum squared elements of matrix.
- Vec2ind: Convert vectors to indices.

Weight and Bias Initialization Functions

- Initcon: Conscience bias initialization function.
- Initzero: Zero weight and bias initialization function.
- Midpoint: Midpoint weight initialization function.
- Randnc: Normalized column weight initialization function.
- Randnr: Normalized row weight initialization function.
- rands: Symmetric random weight/bias initialization function.

Function Reference

Weight and Bias Initialization Functions

- **Revert:** Change ntwk wts. and biases to prev. initialization values.

Weight Derivative Function

- **Ddotprod:** Dot product weight derivative function.

Weight Functions

- **Dist:** Euclidean distance weight function.
- **Dotprod:** Dot product weight function.
- **Mandist:** Manhattan distance weight function.
- **Negdist:** Negative distance weight function.
- **Normprod:** Normalized dot product weight function.

Function Reference

Transfer Function

- **Compet:** Competitive transfer function.
- **Hardlim:** Hard limit transfer function.
- **Hardlims:** Symmetric hard limit transfer function
- **Logsig:** Log sigmoid transfer function.
- **Poslin:** Positive linear transfer function
- **Purelin:** Linear transfer function.
- **Radbas:** Radial basis transfer function.
- **Satlin:** Saturating linear transfer function.
- **Satlins:** Symmetric saturating linear transfer function
- **Softmax:** Softmax transfer function.
- **Tansig:** Hyperbolic tangent sigmoid transfer function.
- **Tribas:** Triangular basis transfer function.