Neural Computation

Week 2

**Linear Regression**

Least Squares Method for Simpler solutions

Linear Regression for Complex solutions

Open Method

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Diagram, text

Description automatically generated

Word

Description automatically generated with medium confidence

Vector dimensions are the number of rows in a vector.

Transpose of a vector is row wise.

Performance measure is the function which quantifies the error in the predictions.

Residual: 

Mean Square Error (MSR): A picture containing text, watch, clock

Description automatically generated

It ignores the sign of residuals and if the error is large, it squares it and makes it evident.

**Gradients**

Derivative is the rate of change of a function. It is the slope of the tangent line to the graph function.

Diagram

Description automatically generated

Partial derivative is the direction of the variable.

Gradient is defined as A picture containing diagram

Description automatically generated

Gradient of a linear function is just a parameter of the linear function

Text

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For quadratic equations A picture containing diagram

Description automatically generated

Minimization/Optimization

Chart, line chart

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Graphical user interface, application

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Closed form solutionssssssssssssssssssss

Least square regression: 1-dimension

Text

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Matrix

Diagram, schematic

Description automatically generated

Closed form solution

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Description automatically generated

Error = Actual Output – Predicted Output

**Polynomial Regression**

The same as linear regression but replace X with f(X).



Chart

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Graphical user interface, text, application

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Less features/power complexity leads to underfitting

More leads to overfitting and model are specific to the training dataset.

Generalization is the model’s ability to predict unseen data.

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Closed form solution for regularized least square regression

Diagram, schematic

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