JULIA PROGRAMMING

Methods

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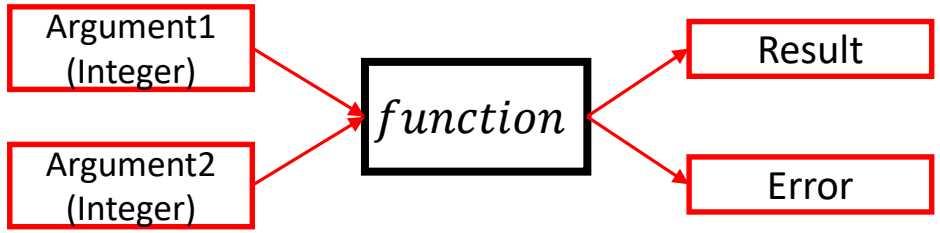
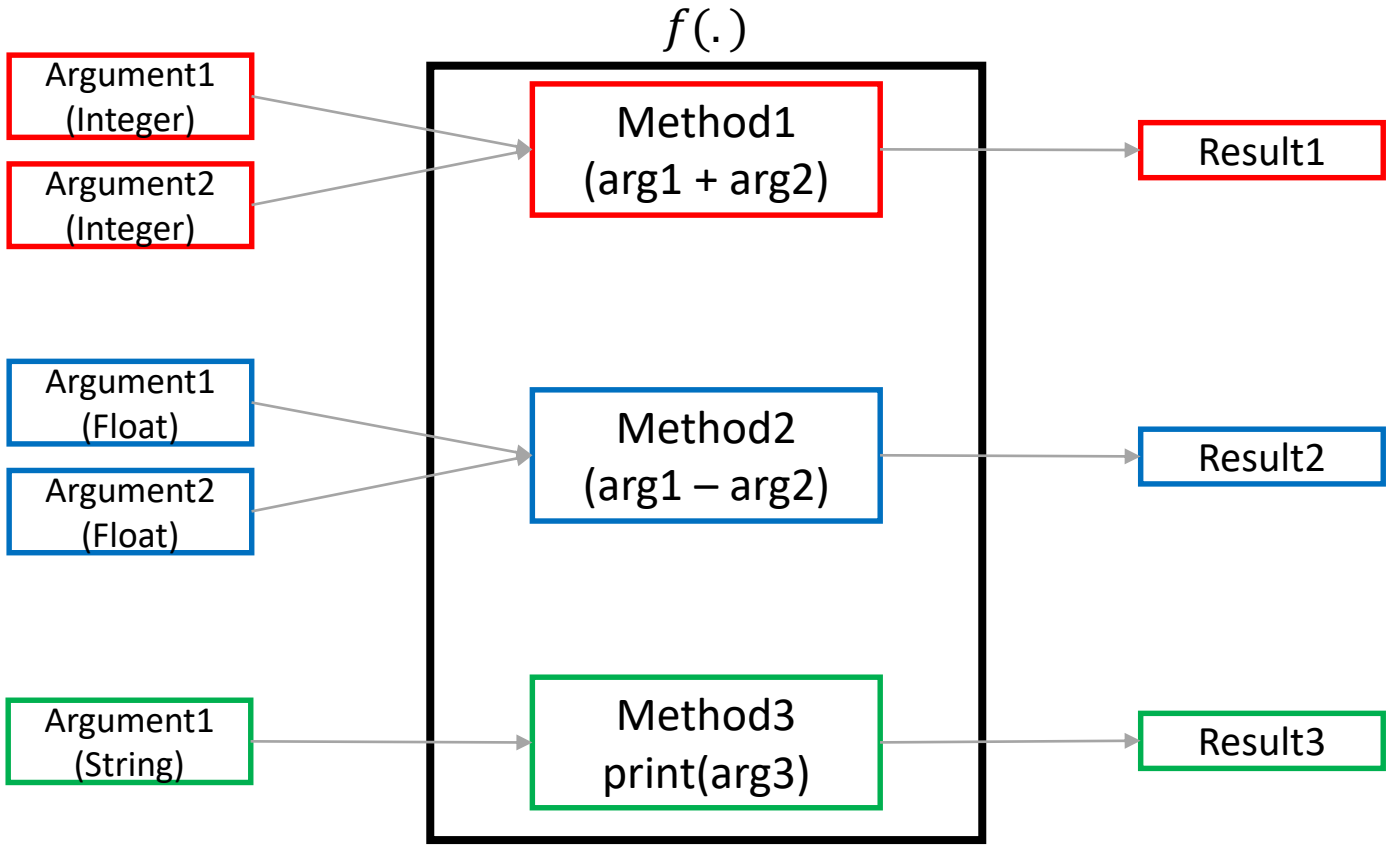
Multiple Dispatch





Multiple Dispatch

Method: Definition of a behavior for a function.

Dispatch: Choice of which method to implement.

Single Dispatch: Method is chosen based on the **first** argument.

Multiple Dispatch: Method is chosen based on **all of the arguments**.

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Multiple Dispatch

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Parametric Methods

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Function Like Objects

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Function Like **Objects**

$$model = c_1x_1 + c_2x_2 + c_3x_3 + \cdots + c_nx_n$$

```
mutable struct model{R}
        c1::R
        c2::R
        c3::R
        .
        .
        .
        cN::R
end
```

```
function (m::model)(x1, x2,...,xN)
        c1*x1 + c2*x2 + ... + cN*xN
end
```

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Constructors

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Neural Network Demo

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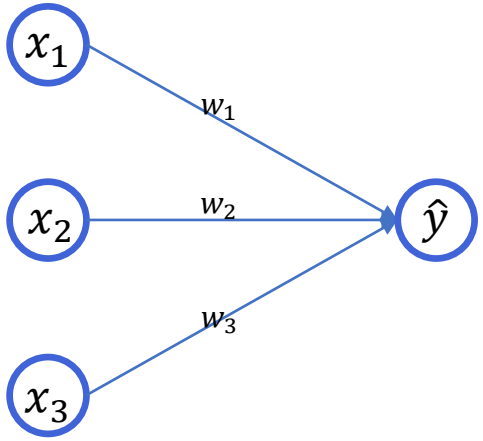
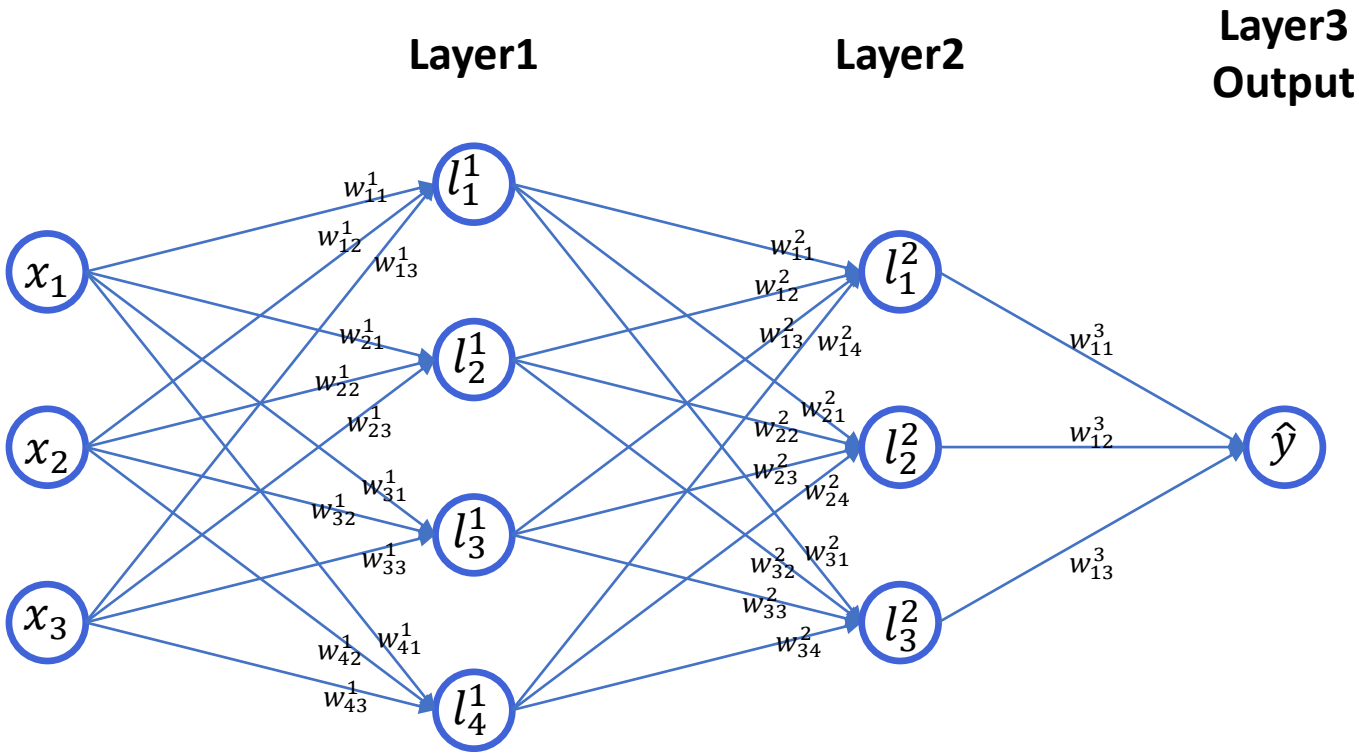
Neural Networks

$$y = x_1 w_1 + x_2 w_2 + x_3 w_3$$

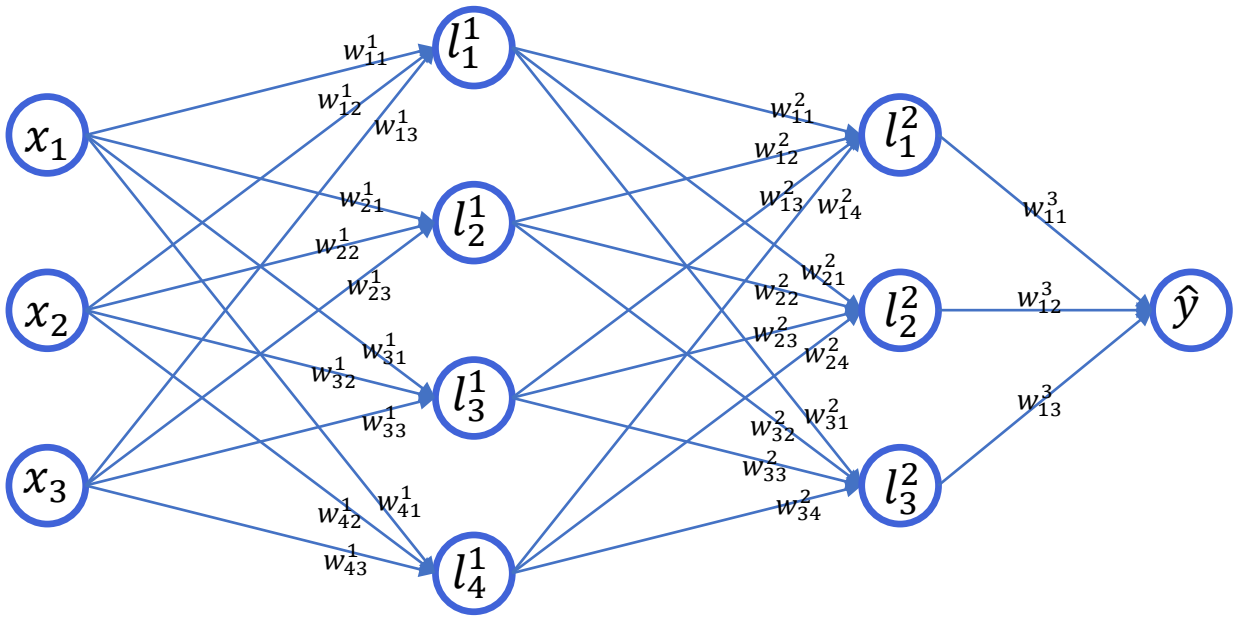




$$l_2^1$$

$$w_{23}^1$$

Neural Networks



$$
\begin{aligned}
w_{11}^1 x_1 + w_{12}^1 x_2 + w_{13}^1 x_3 &= l_1^1 \\
w_{21}^1 x_1 + w_{22}^1 x_2 + w_{23}^1 x_3 &= l_2^1 \\
w_{31}^1 x_1 + w_{32}^1 x_2 + w_{33}^1 x_3 &= l_3^1 \\
w_{41}^1 x_1 + w_{42}^1 x_2 + w_{43}^1 x_3 &= l_4^1
\end{aligned}
$$

$$
\begin{bmatrix} w_{11}^1 & w_{12}^1 & w_{13}^1 \\ w_{21}^1 & w_{22}^1 & w_{23}^1 \\ w_{31}^1 & w_{32}^1 & w_{33}^1 \\ w_{41}^1 & w_{42}^1 & w_{43}^1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} l_1^1 \\ l_2^1 \\ l_3^3 \\ l_4^4 \end{bmatrix}
$$

$$
\begin{aligned}
w_{11}^2 l_1^1 + w_{12}^2 l_2^1 + w_{13}^2 l_3^1 + w_{14}^2 l_4^1 &= l_1^2 \\
w_{21}^2 l_1^1 + w_{22}^2 l_2^1 + w_{23}^2 l_3^1 + w_{24}^2 l_4^1 &= l_2^2 \\
w_{31}^2 l_1^1 + w_{32}^2 l_2^1 + w_{33}^2 l_3^1 + w_{34}^2 l_4^1 &= l_3^2
\end{aligned}
$$

$$
\begin{bmatrix} w_{11}^2 & w_{12}^2 & w_{13}^2 & w_{14}^2 \\ w_{21}^2 & w_{22}^2 & w_{23}^2 & w_{24}^2 \\ w_{31}^2 & w_{32}^2 & w_{33}^2 & w_{34}^2 \end{bmatrix} \begin{bmatrix} l_1^1 \\ l_2^1 \\ l_3^1 \\ l_4^1 \end{bmatrix} = \begin{bmatrix} l_1^2 \\ l_2^2 \\ l_3^2 \end{bmatrix}
$$

$$
w_{11}^3 l_1^2 + w_{12}^3 l_2^2 + w_{13}^3 l_3^2 = \hat{y}
$$

$$
\begin{bmatrix} w_{11}^3 & w_{12}^3 & w_{13}^3 \end{bmatrix} \begin{bmatrix} l_1^2 \\ l_2^2 \\ l_3^2 \end{bmatrix} = \hat{y}
$$

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