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# LINEAR

CLASS   `torch.nn.Linear(in_features, out_features, bias=True, device=None, dtype=None)`   [\[SOURCE\]](#)

Applies a linear transformation to the incoming data:  $y = xA^T + b$

This module supports **TensorFloat32**.

Parameters

- **in\_features** – size of each input sample
- **out\_features** – size of each output sample
- **bias** – If set to `False`, the layer will not learn an additive bias. Default: `True`

Shape:

- Input:  $(*, H_{in})$  where  $*$  means any number of dimensions including none and  $H_{in} = \text{in\_features}$ .
- Output:  $(*, H_{out})$  where all but the last dimension are the same shape as the input and  $H_{out} = \text{out\_features}$ .

Variables

- **~Linear.weight** (*torch.Tensor*) – the learnable weights of the module of shape  $(\text{out\_features}, \text{in\_features})$ . The values are initialized from  $\mathcal{U}(-\sqrt{k}, \sqrt{k})$ , where  $k = \frac{1}{\text{in\_features}}$
- **~Linear.bias** – the learnable bias of the module of shape  $(\text{out\_features})$ . If `bias` is `True`, the values are initialized from  $\mathcal{U}(-\sqrt{k}, \sqrt{k})$  where  $k = \frac{1}{\text{in\_features}}$

Examples:

```
>>> m = nn.Linear(20, 30)
>>> input = torch.randn(128, 20)
>>> output = m(input)
>>> print(output.size())
torch.Size([128, 30])
```

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