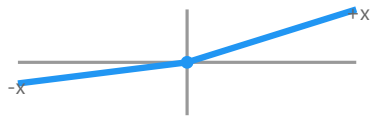


ELU & SELU: Advanced Activation Functions

ELU

Exponential Linear Unit

$$f(x) = x \text{ if } x > 0$$
$$f(x) = \alpha(e^x - 1) \text{ if } x \leq 0$$

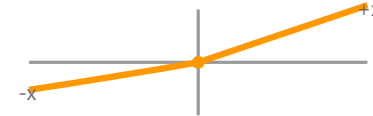


- ✓ Smooth exponential curve
- ✓ Negative values → zero mean
- ✓ Reduces bias shift
- ✓ More robust to noise

SELU

Scaled Exponential Linear Unit

$$f(x) = \lambda \times \text{ELU}(x)$$
$$\lambda \approx 1.05, \alpha \approx 1.67$$



- ✓ Self-normalizing properties
- ✓ Maintains mean/variance
- ✓ No Batch Norm needed

SPECIAL PROPERTY

Auto-normalization without Batch Normalization

Usage Comparison

Aspect	ELU	SELU
Computation	Exponential (moderate)	Exponential (moderate)
Best Use	General improvements	Fully-connected networks
Key Benefit	Faster learning vs ReLU	Self-normalization