

ML algorithm category	Input	Output	Use Case
<b>Dimensionality Reduction</b>	$\mathbf{x} \in \mathbb{R}^d$	$\mathbf{y} \in \mathbb{R}^2$	<b>[insights]</b> 2D coordinates to create a “data map”
	$\mathbf{x} \in \mathbb{R}^d$	$\mathbf{y} \in \mathbb{R}^q$ with $q < d$	<b>[data preprocessing]</b> remove redundant features
<b>Outlier/Anomaly Detection</b>	$\mathbf{x} \in \mathbb{R}^d$	$y \in [0, 1]$	<b>[insights]</b> understand anomalies
			<b>[data preprocessing]</b> remove outliers
			<b>[automation]</b> alert for anomalies
<b>Clustering</b>	$\mathbf{x} \in \mathbb{R}^d$	$y \in \{0, \dots, k - 1\}$	<b>[insights]</b> understand naturally occurring groups
<b>Regression</b>	$\mathbf{x} \in \mathbb{R}^d$	$y \in \mathbb{R}$	<b>[automation]</b> predict continuous value
<b>Classification</b>	$\mathbf{x} \in \mathbb{R}^d$	$y \in \{0, 1\}$	<b>[automation]</b> predict binary label (2 classes)
	$\mathbf{x} \in \mathbb{R}^d$	$y \in \{0, \dots, k - 1\}$	<b>[automation]</b> predict multi-class label ( $k$ classes)
	image	bounding box	<b>[automation]</b> object recognition
<b>Recommender System</b>	user	relevant items	<b>[automation]</b> ranking of a set of items
<b>Information Retrieval</b>	item	similar items	<b>[automation]</b> ranking of a set of items
<b>Generative AI</b>	audio	text	<b>[automation]</b> speech recognition
	text	audio	<b>[automation]</b> speech / music generation
	text	text	<b>[automation]</b> machine translation
	text	text	<b>[automation]</b> text generation (e.g., summaries)
	text	image	<b>[automation]</b> image generation
	image	text	<b>[automation]</b> image captioning
	image	image	<b>[automation]</b> neural style transfer
<b>Reinforcement Learning</b>	images & more	action	<b>[automation]</b> play (video) game, move robot arm, etc.
<b>Additional Steps</b>	learned model	explanation	<b>[insights]</b> understand why the model predicts $y$
	learned model	optimal $\mathbf{x} \in \mathbb{R}^d$	<b>[insights]</b> find a $\mathbf{x}$ with which the model predicts the desired $y$