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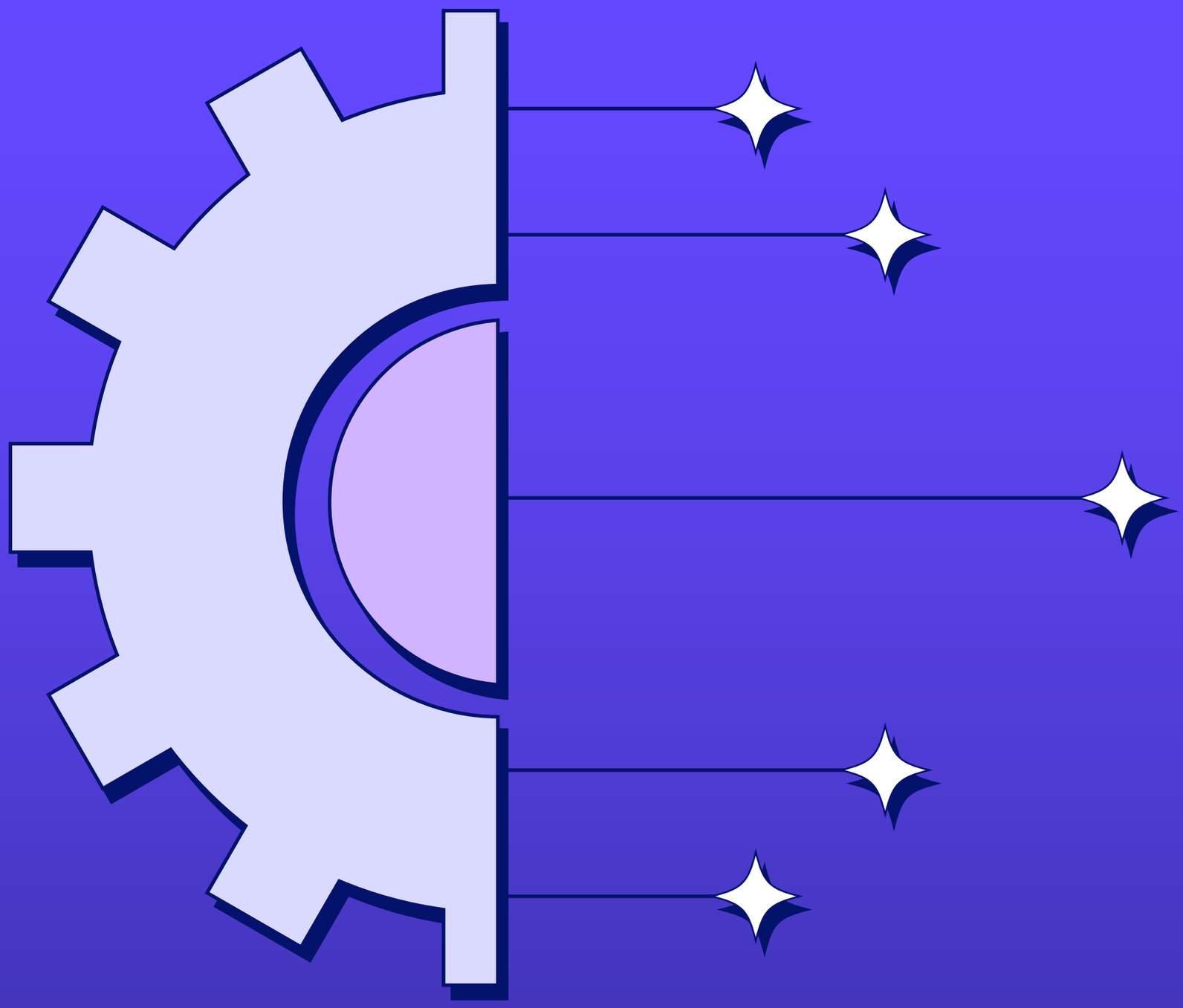
AN INTRODUCTION TO 3 POPULAR MACHINE LEARNING MODELS



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1
Linear Regression

Linear regression is a supervised learning algorithm that's used to discover a linear line within scattered data points.

The goal is to model the connection between independent variables and a numerical outcome by fitting the equation of a line to the given data.

The resulting line can then be tasked with predicting future values.

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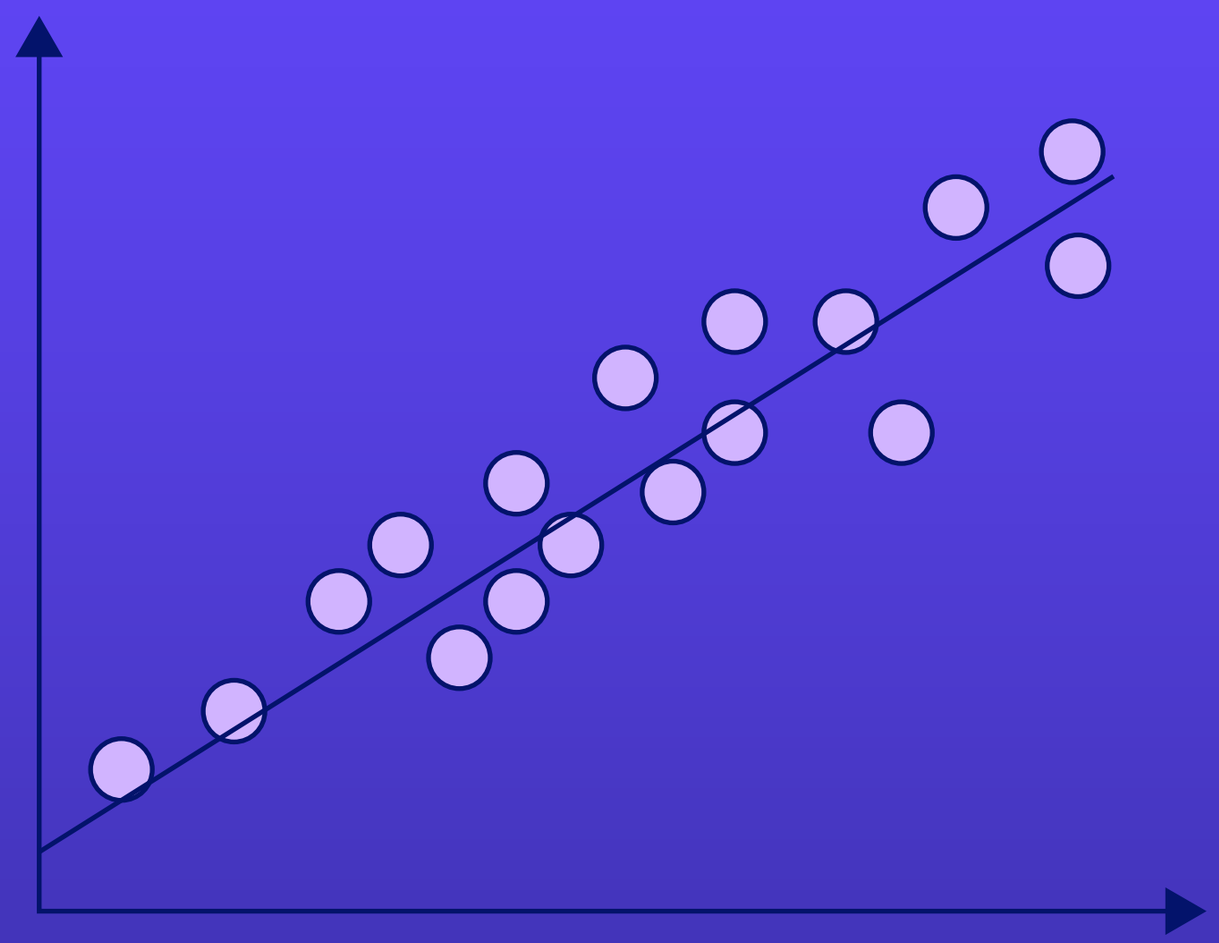
Linear Regression Visualized:

The line that best fits is referred to as the regression line, and it's expressed through this linear equation:

$$Y = a * X + b$$



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Use cases for Linear Regression:

- **Stock price prediction:** Model the relationship between financial indicators and stock prices.

- **Route and pricing optimization:** Ride-sharing platforms like Uber leverage regression analysis to optimize routes.

- **Real estate valuation:** Real estate agents, sellers, and buyers use regression methods to assess property values.

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2
Logistic Regression

Despite regression being in the name, it's actually a classification algorithm!

Logistic regression is used to predict binary values. It determines the likelihood of an event by aligning data with a logistic function.

The logistic regression model uses the logistic function to predict the likelihood of a binary result, with the range of 0 to 1.

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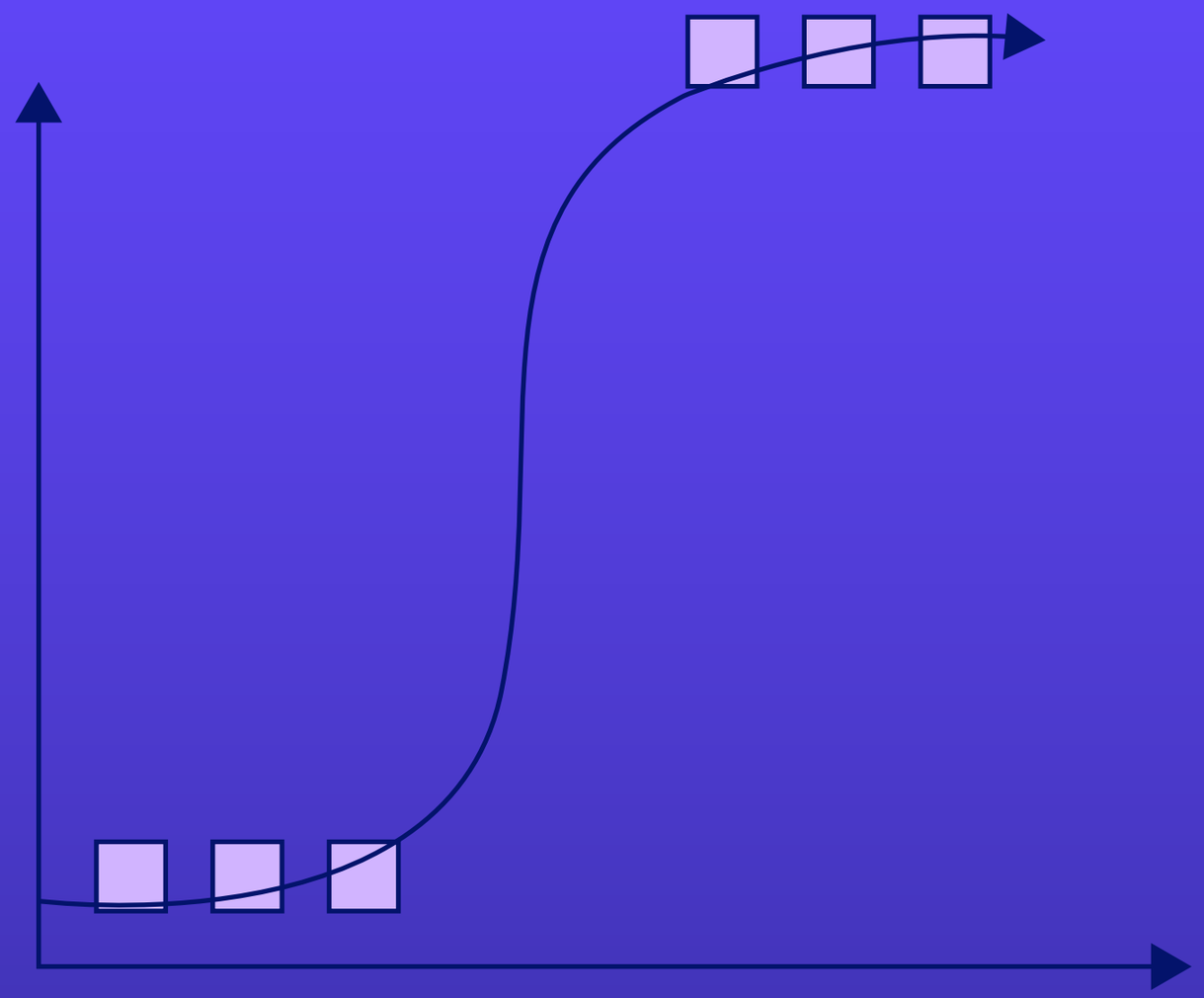
Logistic Regression Visualized:

The logistic function is defined as:

$$\mathcal{P} = \frac{1}{1 + e^{-}(a+b_1 x_1+b_2 x_2+\ldots+b_n x_n)}$$



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Use cases for Logistic Regression:

- **Marketing and customer analytics:** Can be used to respond to a marketing campaign based on demographic and behavioral data.

- **Natural language processing (NLP):** Text sentiment analysis can utilize the logistic regression method to classify text as positive or negative.

- **Epidemiology:** Can be used to study the risk factors for a particular disease

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3
Decision Tree

The objective is to construct a model capable of predicting the value of a variable by acquiring rules deduced from the features within the data.

Each node represents a choice based on a feature by recursively partitioning the data.

This model can also be used for both classification and regression tasks.

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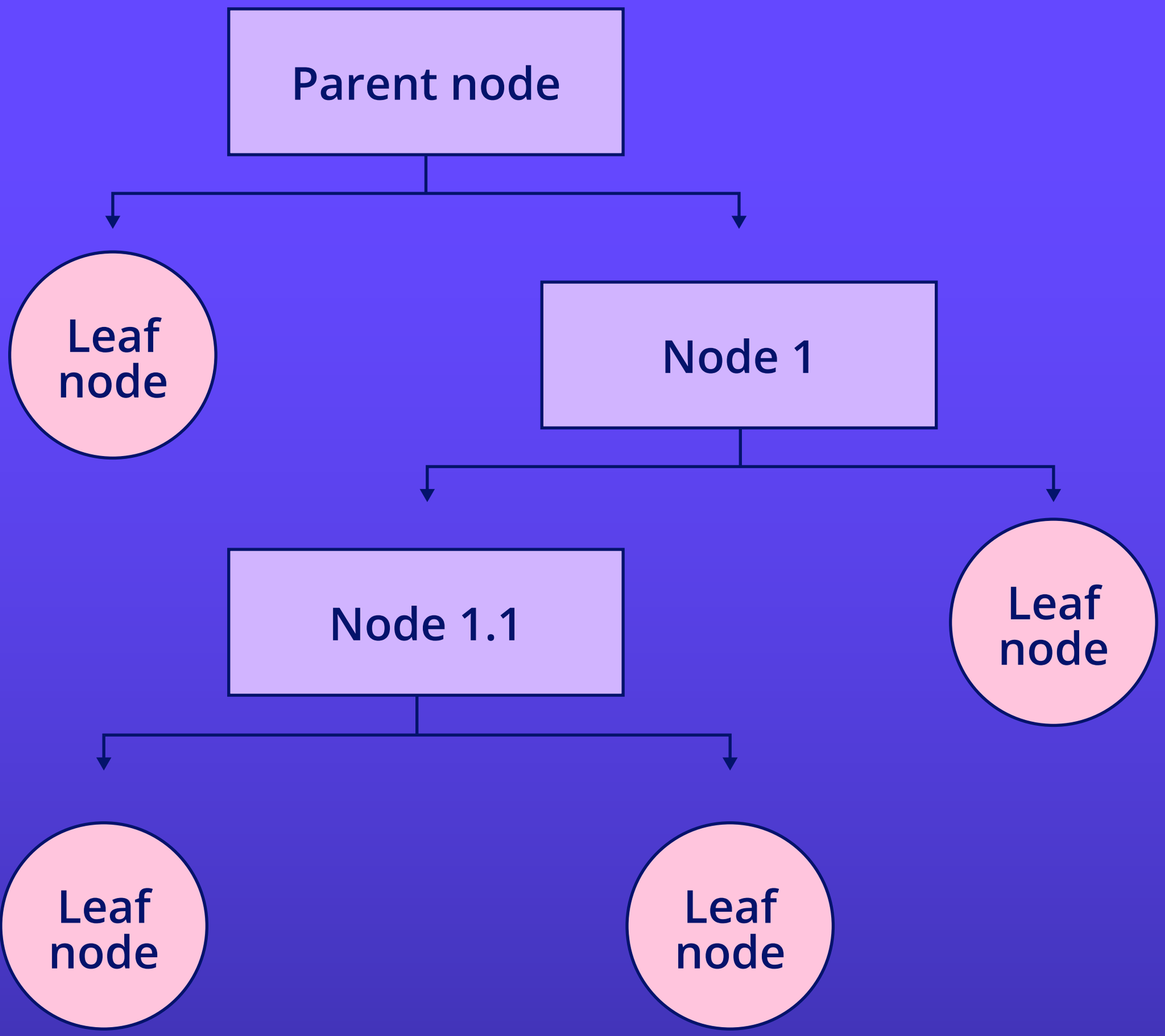
Decision Tree Visualized:



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Use cases for Decision Trees:

- **Credit scoring:** Used to assess creditworthiness by analyzing income, credit history, and debt.

- **Customer churn prediction:** Predict whether a customer will churn based on usage patterns, customer service interactions, and feedback.

- **Energy consumption forecasting:** Forecast energy consumption by analyzing historical usage patterns and weather data.