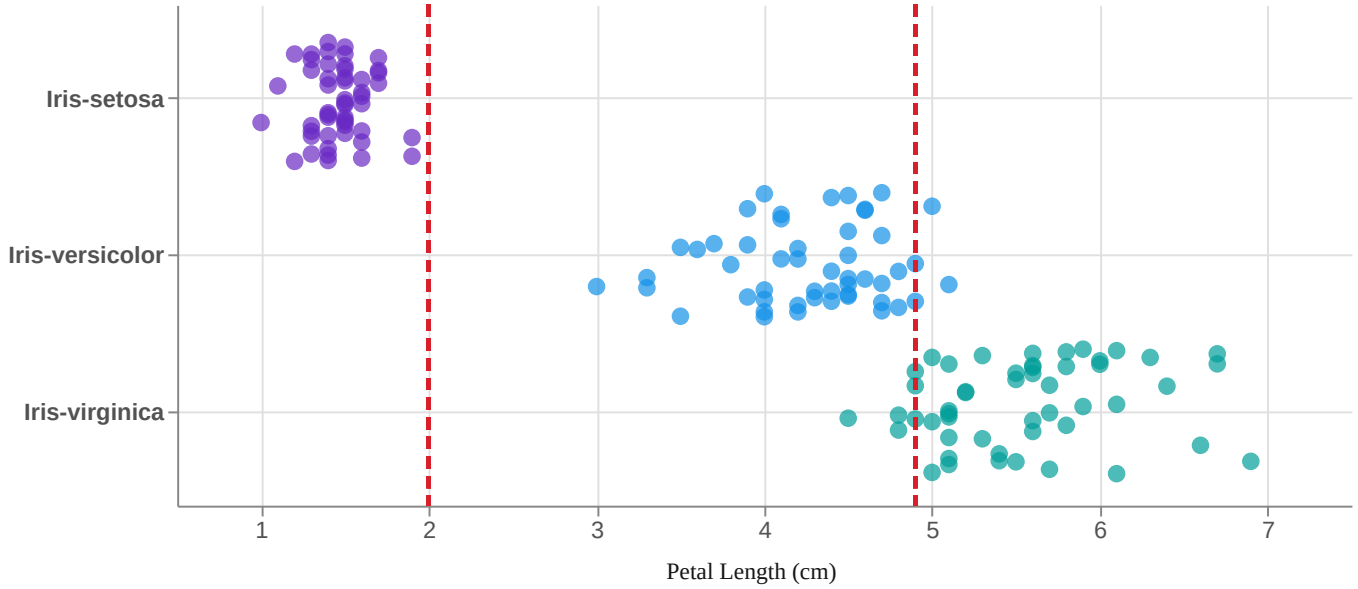
Petal length alone separates iris species: setosa under 2cm, virginica mostly over 5cm

Classic Fisher Iris dataset: 150 flowers across 3 species (50 each), with petal length as the x-axis variable and species shown on the y-axis via strip plot.



Distribution of petal length by species showing near-complete separation thresholds

Dataset Snapshot

Classic Fisher Iris dataset: 150 flowers across 3 species (50 each), with petal length as the x-axis variable and species shown on the y-axis via strip plot.

Key Insight

Petal length creates two clear decision boundaries (marked by red dashed lines at ~2 cm and ~4.9 cm) that separate the three iris species with minimal overlap.
- Iris-setosa occupies a fully isolated zone: all specimens fall between ~1.0–1.9 cm, with zero overlap to other species.
- Iris-versicolor clusters predominantly between ~3.0–5.0 cm, with most points between 3.5 and 4.9 cm.
- Iris-virginica spans ~4.5–7.0 cm, with the majority of specimens falling above the 4.9 cm threshold.
- Only versicolor and virginica show minor overlap in the ~4.5–5.0 cm zone, representing a small fraction of specimens.

Practical read: A two-rule system — 'under 2 cm = setosa, over 4.9 cm = virginica, else versicolor' — achieves high classification accuracy using a single measurement.

Supporting Chart

Strip plot with jittered points by species (purple = setosa, blue = versicolor, teal = virginica) with two red dashed vertical boundary lines at approximately 2.0 cm and 4.9 cm illustrating decision thresholds.

Why This Matters

- Demonstrates that simple threshold rules on a single variable can yield strong classification performance.
- Petal length is why the Iris dataset is the canonical 'hello world' of machine learning and decision trees.
- Setosa is perfectly linearly separable from the other two species on this single feature alone.

Confidence and Limits

The overlap zone between versicolor and virginica near 4.5–5.0 cm requires a secondary feature such as petal width for reliable disambiguation. The strip plot's jitter may slightly obscure the exact density of overlapping points.