🔍 1. Number of Major Vessels Colored by Fluoroscopy (0–4)

💡 What it means:

This feature refers to the number of major coronary vessels (usually 0 to 4) that are visible (colored) during a fluoroscopy procedure (a type of X-ray imaging with dye contrast).

🧠 Why it matters:

- The dye highlights blood flow through the coronary arteries.
- If fewer vessels are visible, it may mean there's a blockage or narrowing, which prevents the dye from passing through.

📊 Interpretation:

Value	Meaning	Risk Level
0	No major vessels are visualized → likely blockages	🚨 High
1–2	Some vessels visualized → possible CAD	⚠️ Moderate
3–4	Most/all major vessels visible → good flow	✅ Low

🚨 0 or 1 major vessels showing dye is often a red flag for coronary artery disease (CAD).

🧬 2. Thalassemia (Thal)

💡 What it is:

In the heart disease context, "Thalassemia" refers to a thalium stress test result rather than the genetic blood disorder. It helps assess how blood flows through the heart muscle, especially under stress.

🧻 Types and What They Mean:

Thal Type	Meaning	Risk Level
Normal	Good blood flow in both rest and stress conditions	✅ Low
Fixed Defect	Poor blood flow permanently – suggests previous heart attack	⚠️ Moderate
Reversible Defect	Poor blood flow during stress only, improves at rest – ischemia	🚨 High

🔢 Dataset Encodings (commonly used):

Thal Type	Value
Normal	3
Fixed Defect	6
Reversible Defect	7

🧠 Reversible defect is particularly important—it points to ischemia, meaning the heart isn't getting enough blood during exertion, which is a major CAD warning sign.

📦 Summary Table

Feature	Values	Interpretation
Major Vessels Colored by Fluoroscopy	0 – 4	Lower number → higher likelihood of blockages
Thalassemia	Normal (3)	Good perfusion
	Fixed Defect (6)	Old heart damage (infarction)
	Reversible (7)	Ischemia – reduced blood flow during stress 🚨

If you're using this in a machine learning heart disease prediction model, both of these are highly predictive features—especially when combined with ST depression, slope, and cholesterol levels.