--- Model Comparison (All Models) ---

Logistic Regression Accuracy: 0.3424
Decision Tree Accuracy: 0.7115
Neural Network Accuracy: 0.4223
Enhanced Neural Network Accuracy: 0.4677

The best performing model is: Decision Tree with accuracy 0.7115

--- Classification Reports ---

Logistic Regression Classification Report:

	precision	recall	f1-score	support
Bronze	0.35	0.59	0.44	1027
Gold	0.34	0.38	0.36	1043
Silver	0.28	0.04	0.07	994
accuracy			0.34	3064
macro avg	0.32	0.34	0.29	3064
weighted avg	0.32	0.34	0.29	3064

Decision Tree Classification Report:

	precision	recall	f1-score	support
Bronze	0.71	0.69	0.70	1027
Gold	0.73	0.73	0.73	1043
Silver	0.70	0.72	0.71	994
accuracy			0.71	3064
macro avg	0.71	0.71	0.71	3064
weighted avg	0.71	0.71	0.71	3064

Neural Network Classification Report:

	precision	recall	f1-score	support
Bronze	0.41	0.51	0.45	1027
Gold	0.46	0.39	0.42	1043
Silver	0.40	0.36	0.38	994
accuracy			0.42	3064
macro avg	0.42	0.42	0.42	3064
weighted avg	0.42	0.42	0.42	3064

Enhanced Neural Network Classification Report:

	precision	recall	f1-score	support
Bronze	0.47	0.48	0.47	1027
Gold	0.49	0.50	0.49	1043
Silver	0.45	0.43	0.44	994
accuracy			0.47	3064
macro avg	0.47	0.47	0.47	3064
weighted avg	0.47	0.47	0.47	3064

Rank	Decision Tree	Importance	Neural Network	Importance	Enhanced Neural Net	Importance
1	Event_Encoded	0.2558	Country_Encoded	0.1053	Country_Encoded	0.1284
2	Athlete_Encoded	0.1567	Sport_Encoded	0.0567	country_medal_count	0.0990
3	Country_Encoded	0.1338	Modality_Encoded	0.0546	sport_popularity	0.0782
4	Year	0.1250	City_Encoded	0.0474	Year	0.0778
5	City_Encoded	0.1203	Gender_Encoded	0.0471	Gender_Encoded	0.0731

--- Summary Reflection ---

1. Did accuracy improve?
Yes, accuracy improved by 0.0454 (10.74%)

2. Did the model train faster/slower?
The new model was faster by 0.14 seconds (1.28%)

3. Which feature seemed more predictive?
Based on the feature importance analysis:
- For Decision Tree: Event_Encoded (Importance: 0.2558) and Athlete_Encoded (Importance: 0.1567)
- For Neural Network: Country_Encoded (Importance: 0.1053) and Sport_Encoded (Importance: 0.0567)
- For Enhanced Neural Network: Country_Encoded (Importance: 0.1284) and country_medal_count (Importance: 0.0990)

Reflection Paragraph
Looking at the latest results, the Decision Tree model still comes out on top with about 71% accuracy, which is way better than both the basic Neural Network (42%) and the Enhanced Neural Network (around 47%). Even though the enhanced version of the neural net did slightly better than the regular one, it's still clear that the Decision Tree handles this medal prediction task much better overall. The feature importance rankings

showed that for the Decision Tree, event and athlete data were the most useful, while the neural networks leaned more on country information, especially when using new features like country_medal_count and sport_popularity. Even with the enhanced model showing a roughly 4.5% accuracy boost and slightly faster training, the neural networks still have a lot of catching up to do. It seems like, for now, the Decision Tree's simpler and more direct approach just fits this problem better, but with more work, the neural networks might be able to close that gap.

Latest Run @ May 29th, 2025 around 10:25PM