Dense Vector

- a dense vector is a numeric representation where most (or all) dimensions have non-zero values, it encodes information smoothly across all dimensions, like this : Ex $[0.12, -0.37, 0.44, 0.05, \ldots 0.1]$
this is what you get from embeddings or Neural Network layers

- Why NN work better with them → 1) continuity: small input changes lead to small output changes, making it easier to learn gradients 2) information spread: Every dimention carries some information (vs sparse vectors with mostly zeros) 3) efficient learning: Dense representations let NNs capture complex patterns and relasionships through weighted combinations 4) Differentiability : works naturaly with Backpropigation since everything is continous and dense

How: models do this automatically since every dim has a non zero continous value
- if you want to ensure it use nethral embeddings (is transformers), not one-hot or sparse bag of words