Below is a detailed example for this concept :-

In the above example there are 8 candies. There are 2 distinct categories the first is the set of candies which is sweet whereas the other is spicy. The problem is to find a solution that if a customer asks for a sweet candy he never gets a spicy one . The same should be when a customer asks for a spicy one he should not get a sweet candy.
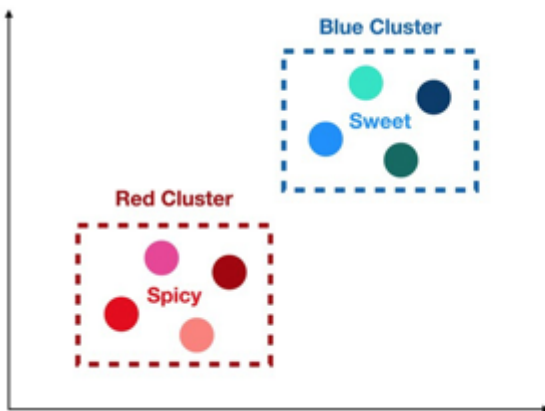
In the above clustering the candies can be clustered in the 2 distinct categories which will fulfil the customers demand. The 2 distinct demand of customer is either a sweet or a spicy candy. This can be easy differentiated

by a human as he is visually able to differentiate the colour and hence fulfil the customers requirement.

However if the same needs to be identified as a part of a AI project where this logic needs to be converted to an algorithm. The machine will not be able to understand the difference and there is a high probability that the customer will be given an incorrect candy.

|	Red	Maroon	Pink	Flamingo	Blue	Turquoise	Seaweed	Ocean
🔴	1	0	0	0	0	0	0	0
🔴	0	1	0	0	0	0	0	0
🟣	0	0	1	0	0	0	0	0
🔴	0	0	0	1	0	0	0	0
🔵	0	0	0	0	1	0	0	0
🟢	0	0	0	0	0	1	0	0
🟢	0	0	0	0	0	0	1	0
🔵	0	0	0	0	0	0	0	1

In the above example there are not 2 categories but 8 categories and clustering is extremely difficult in this. Every candy is an individual colour. There is no relationship which has been drawn so it difficult to create a algorithm to predict the taste of the candy.

Though there are 8 different colours and clusters which are equidistant from each other however there are 4 candy which are sweet and 4 which are spicy.

Dimensionality Reduction is the only solution to this problem.

	Red	Blue
Red	1.00	0
Maroon	1.20	-0.10
Pink	1.00	0.20
Flamingo	0.80	0
Blue	0	1.00
Turquoise	0.25	0.90
Seaweed	0.15	1.00
Ocean	-0.10	1.20

In the above example each colour features is exposure to the latent features. Post this if the same can be plotted in a graph this will help in clustering easily.
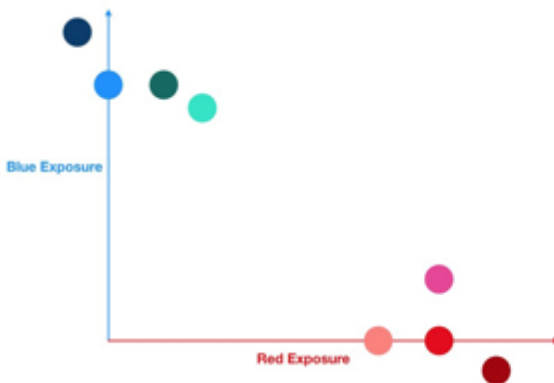
In the above graph there are 2 distinct colours which is Red & Blue .Red represents Spicy candy whereas Blue is sweet.
So whenever there is a new candy the colour is recorded and then it is transformed to its exposure to Red & Blue. Using the latent feature it can easily be found out whether it is close to Red or Blue. So Once this is done it is easily ascertained if it is Spicy or Sweet.

This is a very important concept when there Is too many features which can create a confusion for machine learning algorithm. This concept helps us to reduce to dimensions which create difficulty and helps in getting the solution.