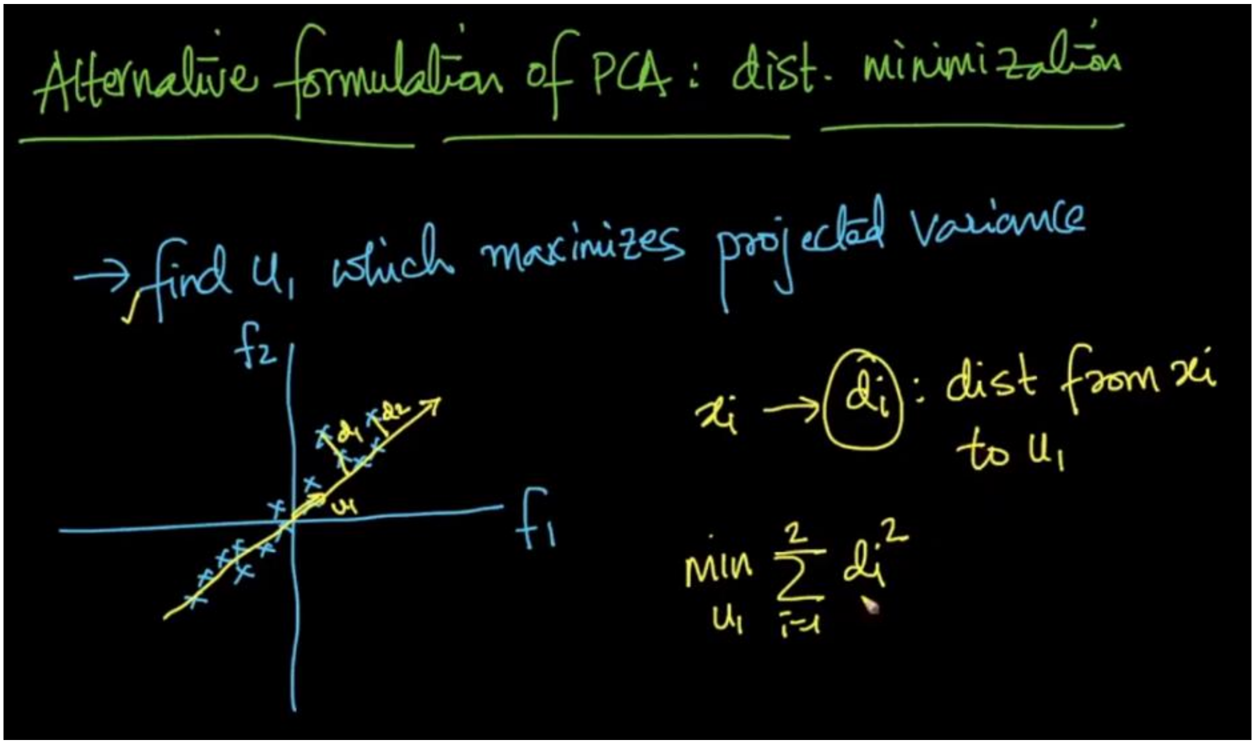
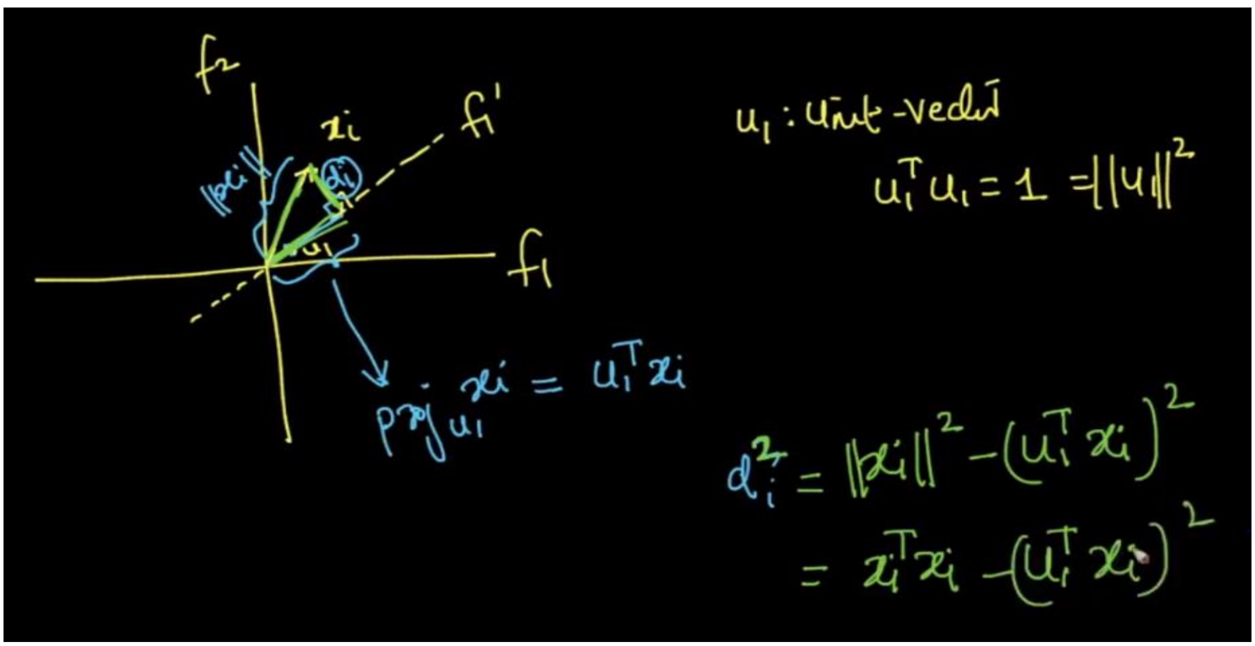
Earlier we have seen for a technique finding a new feature or direction which was finding the direction where the variance was maximum, in this we will see a new technique called **distance minimization.**

Objective: In this technique the objective is to find the direction from which the distance (d_i) is minimum from (x_i).

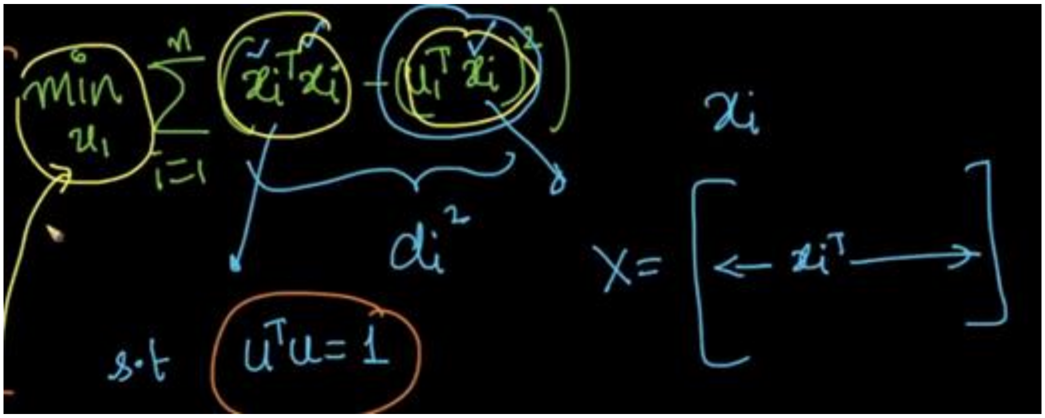


How we find distance of x_i and u1. Since the projection of x_i on u1 forms a right angle triangle so we can apply Pythagoras to find d_i.

The calculation is given in below fig.



Now our ultimate aim is to find a direction u1 such that it has minimum distance from $x_{i,}$ given a constraint that $u^Tu = 1$



We've seen two different techniques for PCA, one is distance minimization PCA and other is variance maximization PCA, and eventually both lead to the same u1.