# Cosine Distance Lab Report

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## 1. Application Architecture

This app is a simple C++ program that finds the cosine angle between each pair of vectors from a file.

The program is broken into small parts to keep things simple and clear:

* - computeMagnitude(): finds the length of a vector
* - computeCosineAngle(): finds the angle between two vectors
* - readVectorsFromFile(): loads vectors from a text file
* Software patterns used:
* - Each function does one job (Single Responsibility)
* - Reading files, math calculations, and showing results are separated (Separation of Concerns)
* - The code is tested using a simple testing tool called doctest (Test-Driven Development)

## 2. Flow Diagram

The steps the program follows are:

1. Start the program
2. Read the input text file with vectors
3. Check that all vectors are the same size
4. Calculate the cosine angle between each pair of vectors
5. Sort the results by the smallest angles first
6. Show the final results

## 3. User Flow Diagram

Start  
 |  
 v  
Read Input File (Vectors)  
 |  
 v  
Check Vector Dimensions  
 |  
 v  
Calculate Cosine Angles  
 |  
 v  
Sort by Smallest Angle  
 |  
 v  
Display Results