MTH 443: Lab Problem Set 1

Problem #1: Consider the "World economic development" dataset (source: International Monetary Fund) (eco_dev_data.csv) containing data on the following economic development indicators of 121 countries.

Economic Development Indicators

Indicator and abbreviation	Aspect of Economic development
GNP per capita at PPP (GNPPER)	Income level
GDP growth rate (GDPGR)	Growth of economy
Gross domestic investment as percentage of GDP (DOMINV)	Level of investment
GDP deflator (GDPDFL)	Inflation
Agriculture value added as percentage of GDP (AGRVLAD)	Structure of output
Industry value added as percentage of GDP (INDVLAD)	Structure of output
Export of goods and services as percentage of GDP (EXP)	Openness of economy
General government consumption as percentage of GDP (GOVCON)	Role of government
Resource balance as percentage of GDP (RESBL)	Net borrowing/lending on account of merchandise trade
Domestic credit provided by the banking sector as percentage of GDP (DOMCRDT)	Private sector financing
Ratio of gross international reserve to imports (GRIIMP)	Strength of foreign exchange reserve
Number of months of import cover (IMPCOV)	Strength of foreign exchange reserve
Interest spread (INTSPRD)	Efficiency of financial market

Obtain Chernoff face visualization of the countries. Try to obtain clusters of countries using the Chernoff faces.

Problem #2: The "Wine dataset" (source: UCI Machine Learning Repository) (Wine_data.csv) gives data that are the results of a chemical analysis of wines grown in the same region in Italy but derived from three different wineries. The analysis determined the quantities of 13 constituents found in each of the three types of wines, these are 1) Alcohol, 2) Malic acid, 3) Ash, 4)Alcalinity of ash, 5) Magnesium, 6) Total phenols, 7) Flavanoids, 8) Nonflavanoid

phenols, 9)Proanthocyanins, 10)Color intensity, 11)Hue, 12)OD280/OD315 of diluted wines and 13)Proline.

(a) Ignoring the Type variable, representing the winery, obtain Chernoff face visualization of the dataset.

(b) Can you cluster & identify the different types using the Chernoff faces? Crosscheck the identified types with the given types.

Problem # 3: Consider the "Bank financial ratios data set' (Source: Reserve Bank of India) (PS_bank_fin_ratio.csv) containing important financial ratios of Indian public sector banks during the period from financial year 1996-1997 to financial year 1999-2000.

Ratio	**Abbreviation**
Return on Equity	ROE
Return on asset	ROA
Cost of deposit	COD
Cost of borrowing	COBR
Return on advances	ROAD
Return on Investment	ROI
Operating profit to total asset	OPTAST
Net Interest income to total asset	NIITAST
Spread=Return on (advance+investment)-cost of deposits	SPRD
Staff expenses to total expenses	STEXTEX
Net NPA to net advances	NET_NPA
Capital adequacy ratio	CAR
Business per employee	BUSEMP
Profit per employee	PFTEMP

(a) Obtain Chernoff face visualization for the each of the financial years.

(b) Detect multidimensional (time) trend of the banks using the Chernoff faces over the years.