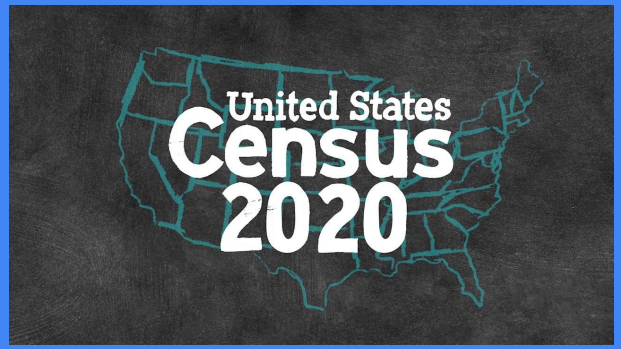

Data Mining: US Census income data

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1. Overview
2. Data Mining process
3. Descriptive analysis
4. Preprocessing
5. PCA
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8. Conclusions

Overview

Goal

- Identify patterns, relationships, and correlations within the data and draw conclusions about the factors that may impact income.

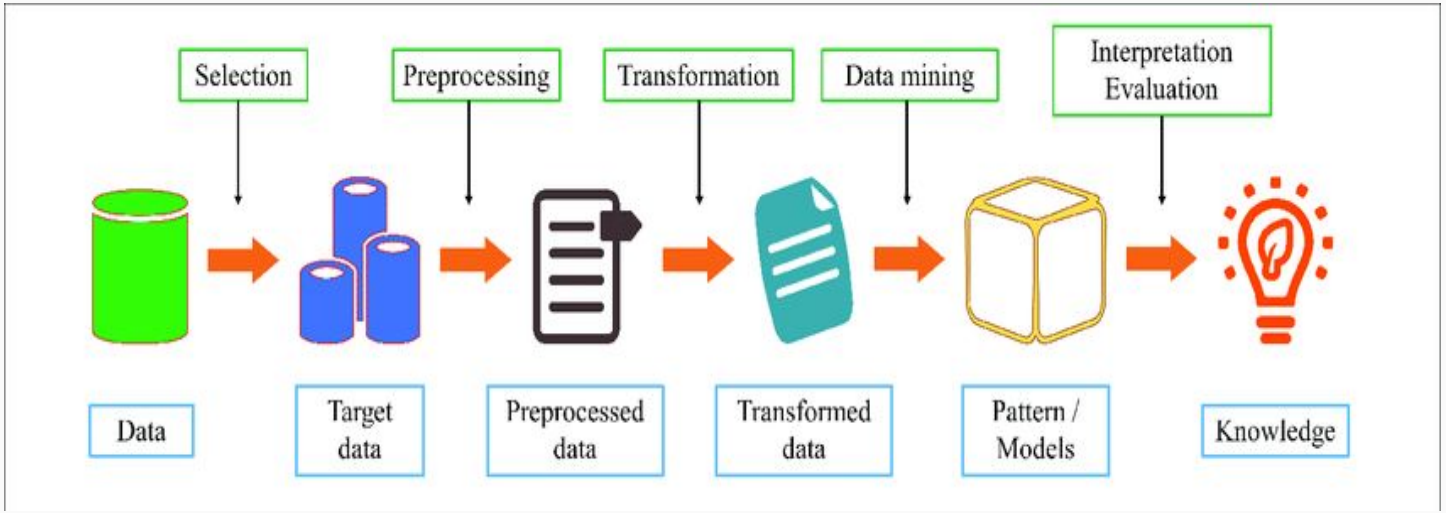
Original Dimension

- 199,523 individuals (rows)
- 42 features (columns)

After Sampling and Data Selection

- 20,000 individuals (rows)
- 28 features (columns)

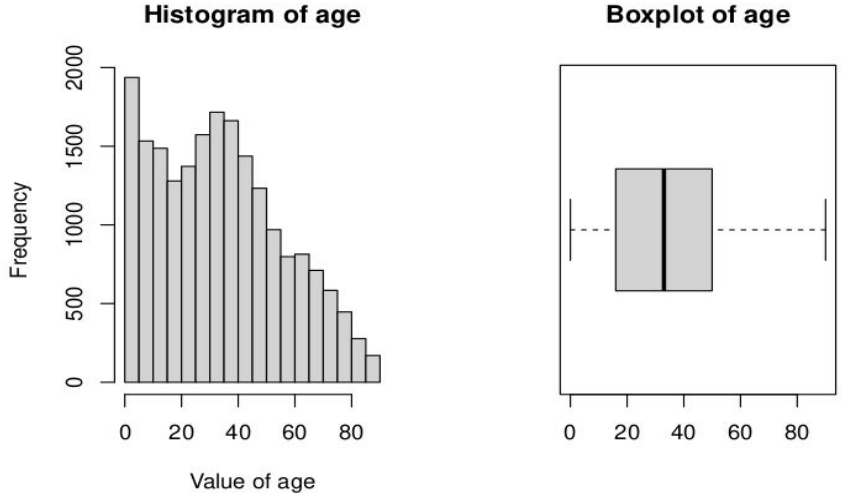
Data Mining Process



Descriptive Analysis

Univariate Analysis

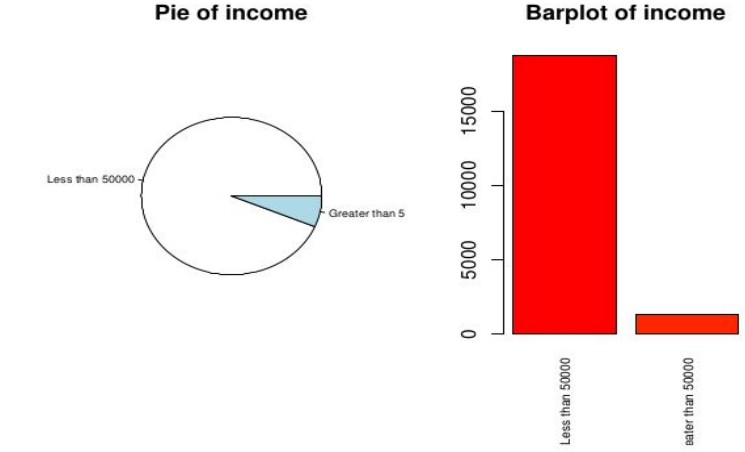
Variable 1 : age



Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	sd	vc.	Missing
0	16	33	34.41035	50	90	22.11444	0.6426684	0

Table 6.3. age extended Summary Statistics.

Variable 28 : income

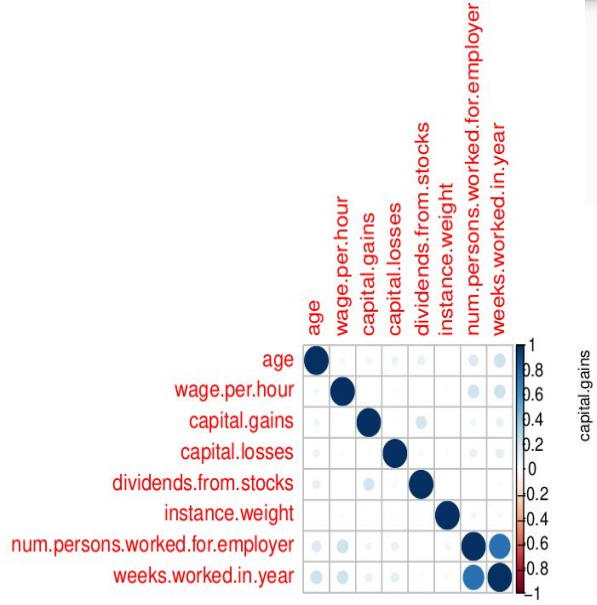


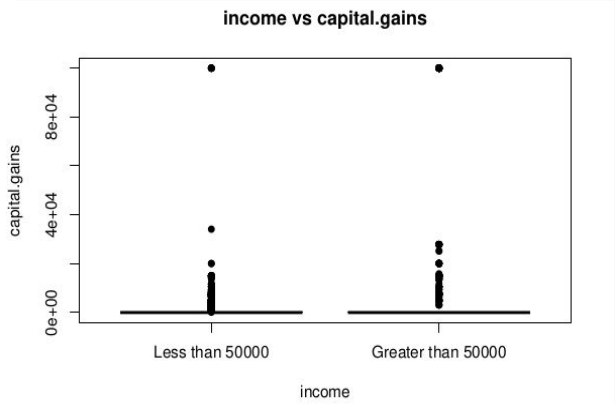
Number of modalities: 2

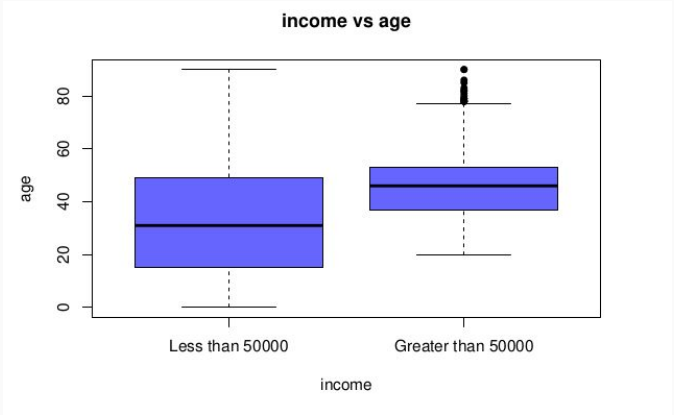
income	Frequency	Proportion
Less than 50000	18728	0.9364
Greater than 50000	1272	0.0636

Table 6.40. income frequency and proportion table.

Bivariate analysis







Preprocessing

1. **Feature selection**
   - Remove features that do not contribute any information to the topic
2. **Prepare and cleaning data**
   - Convert missing data value
   - Categorical value to factors
   - Set levels

Preprocessing

3. Missing data: all categorical data

Group	Description	Strategy
1	less than 10%	try to impute or create new category
2	Above 50%	remove

Preprocessing

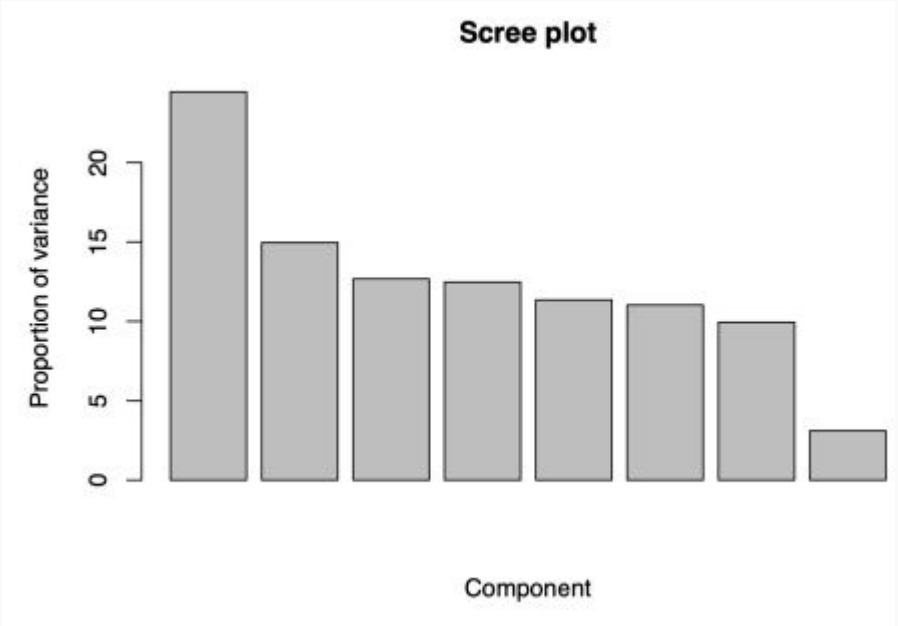
Group 1: hispanic origin, country of birth self

Group 2: class of worker, major industry code, major occupation code, live in this house 1 year ago …

Group 3: enrolled in edu inst last wk, member of a labor union, …

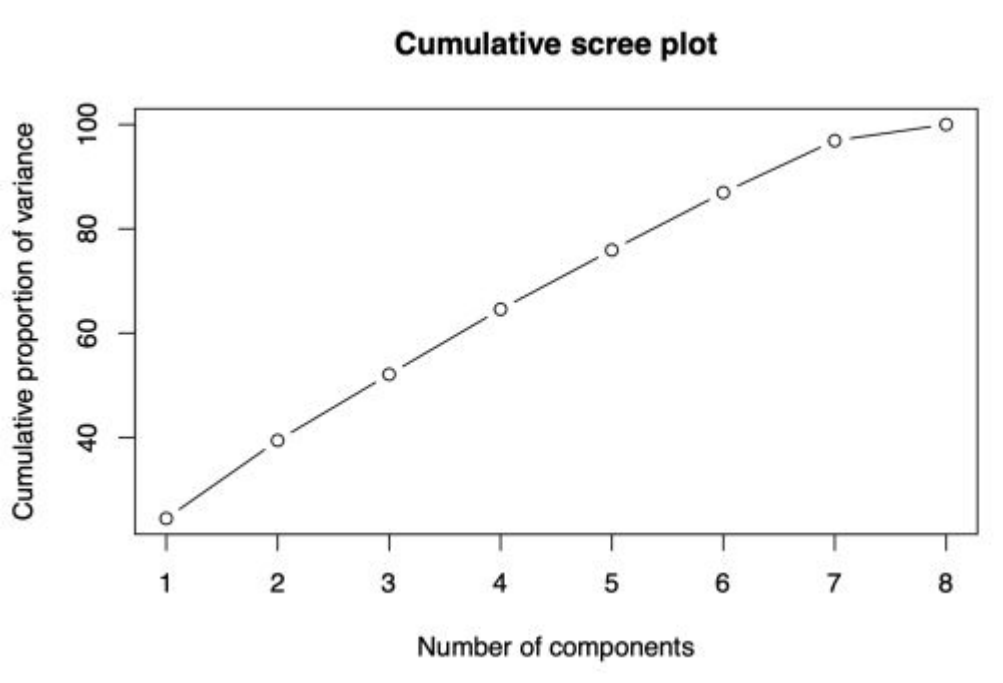
PCA

- Similar amount of variance



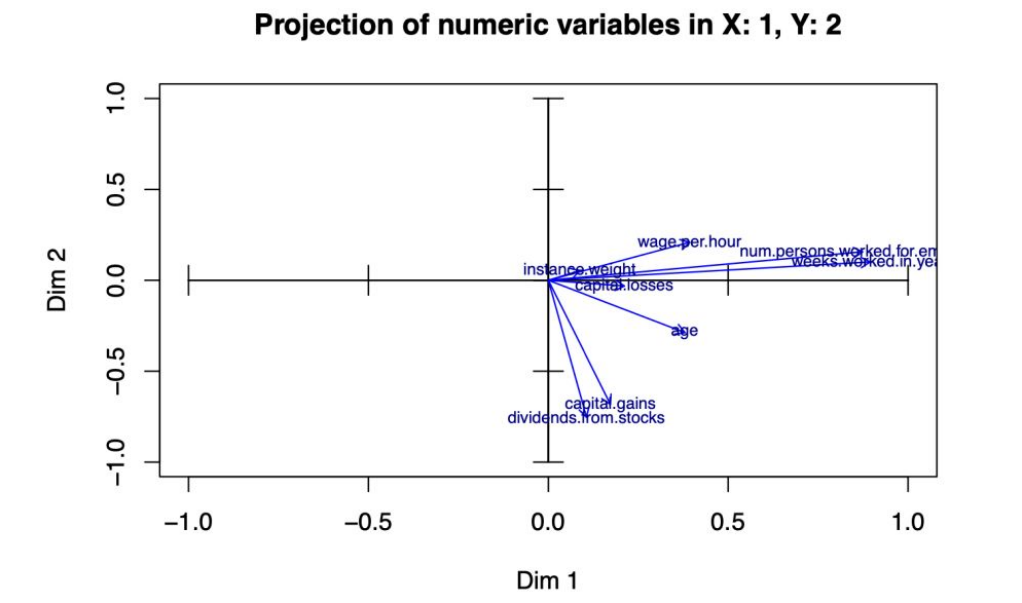
PCA

- 5 components =~ 80%
- We choose 5 PCs to represent our data



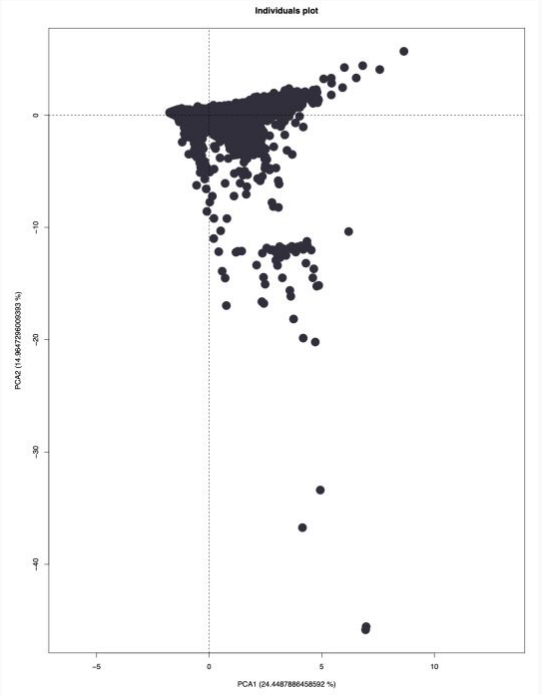
PCA

- Most important in y-axis:
  - Dividends from stocks
  - Capital gains
- Most important in x-axis:
  - weeks worked in a year
  - number of persons worked for the employer
- Positive correlation between:
  - capital gains, dividends from stocks and age
- Negative correlation y–axis
  - Wage per hour and age



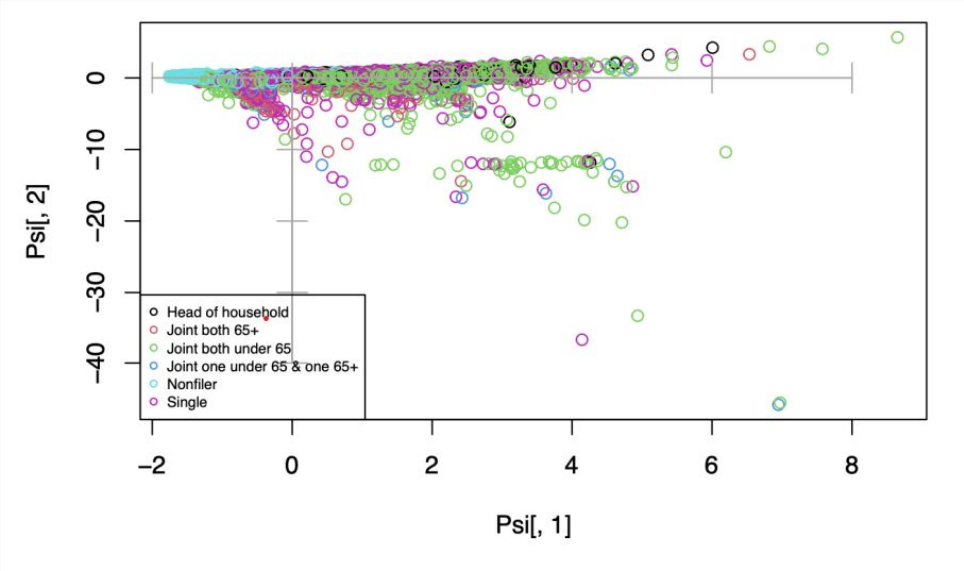
PCA

- Most observations are clustered around the center of the plot
- Some outliers



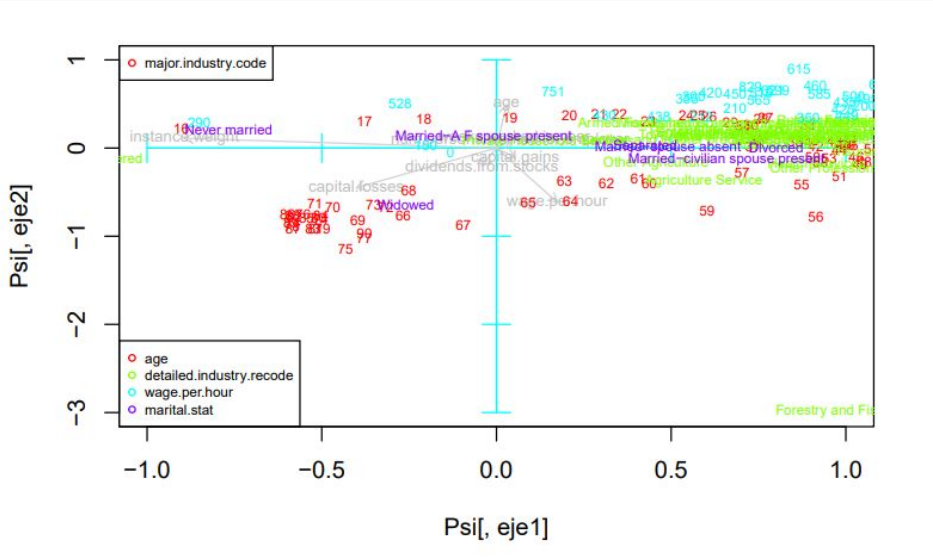
PCA

- detailed.household.and.family.stat
- Nonfiler: identifies taxpayers who have not filed a federal or state individual income tax return for the tax year under review



PCA

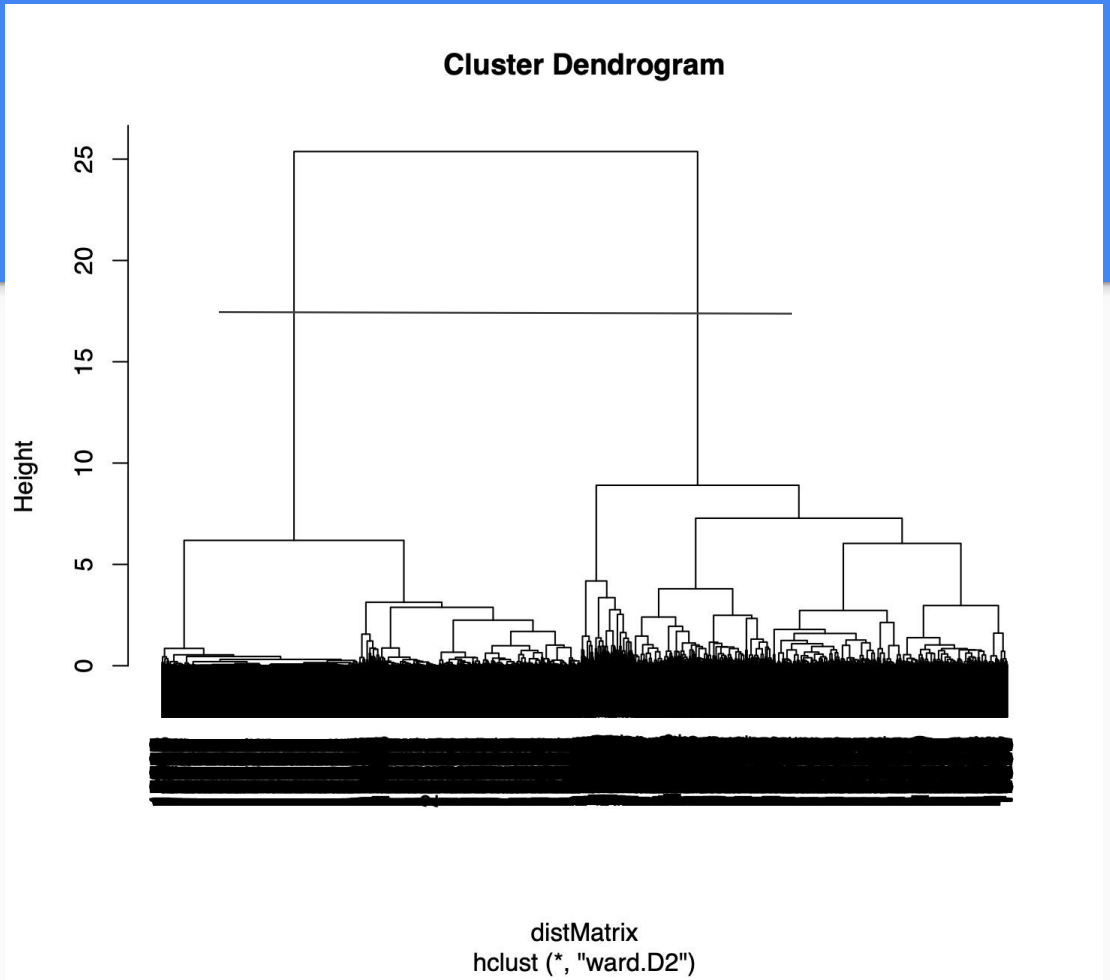
- Centroids for the factors with respect to the principal components
- Widowed: their ages tend to be older
- Capital loses seem to be highly related with higher ages



Clustering

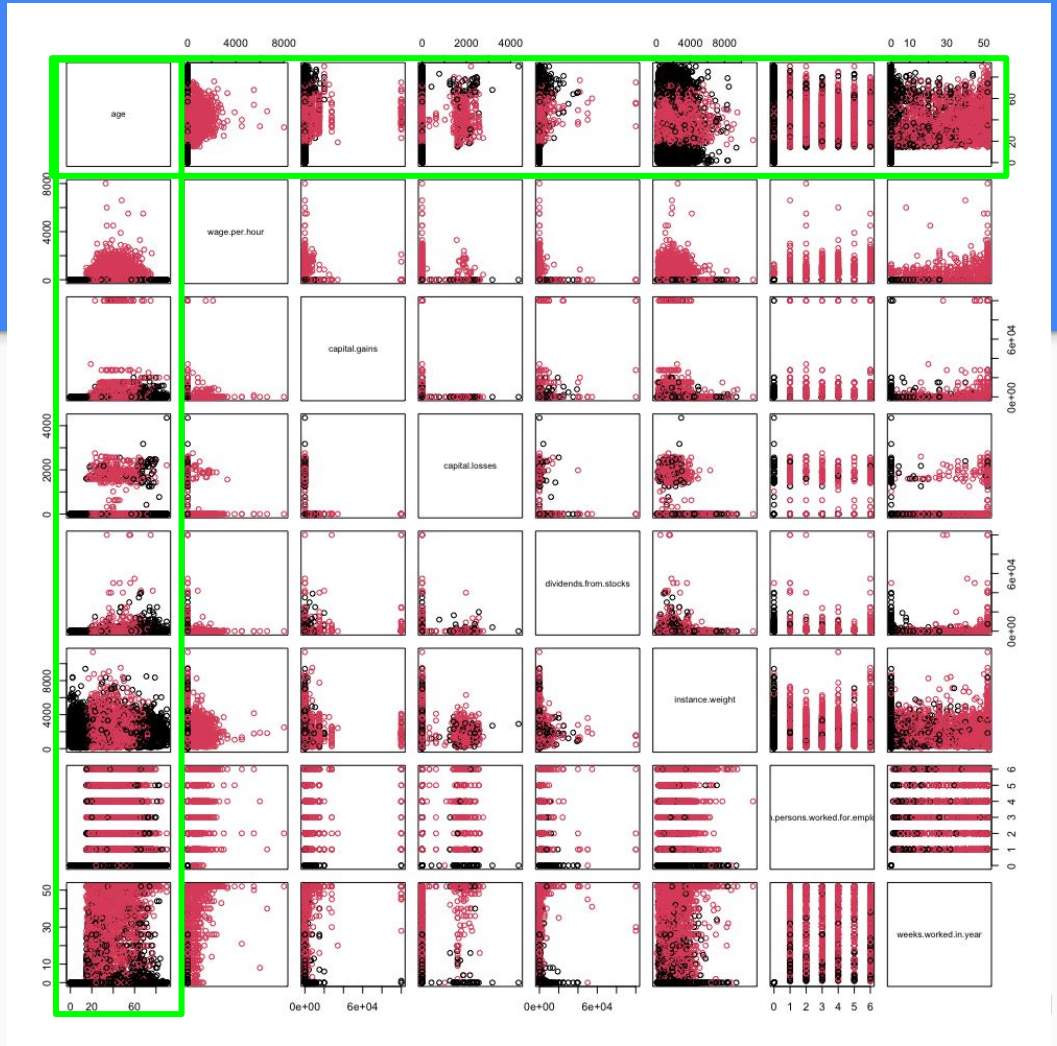
method="ward.D2"
metric = "gower"

1	2
9923	10077

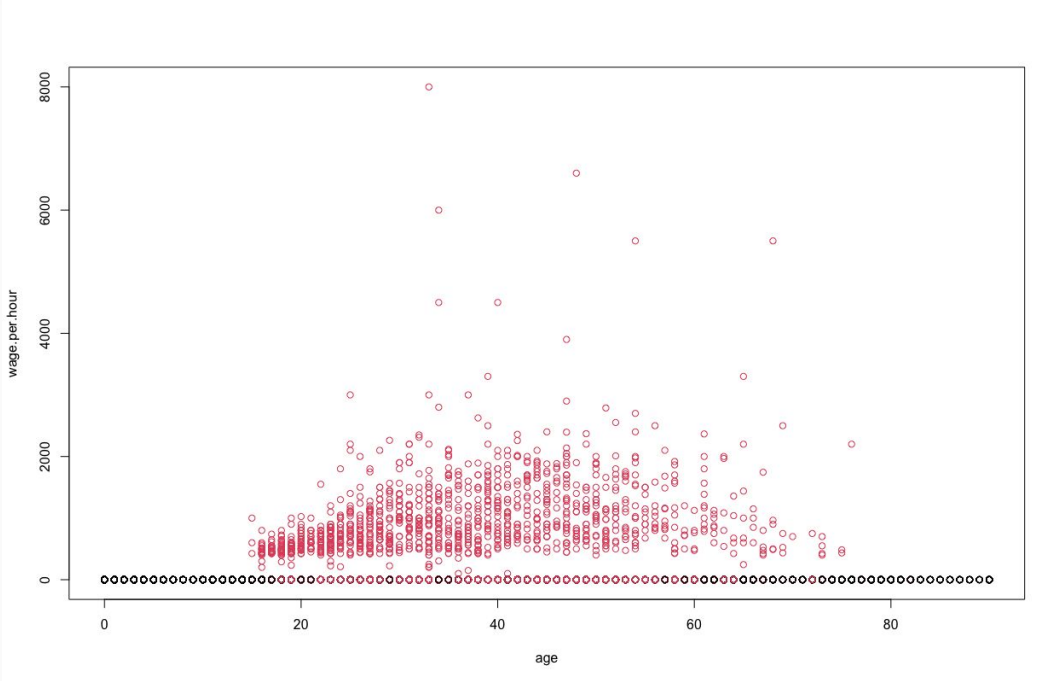


Clustering

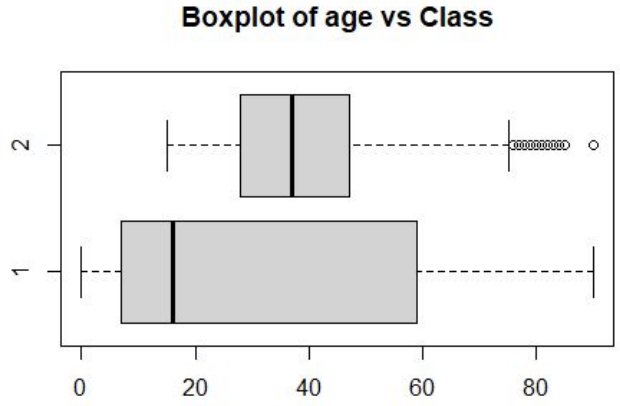
Cluster 1 = Age: 0-17 -> 65-90
Cluster 2 = Age: 18-64

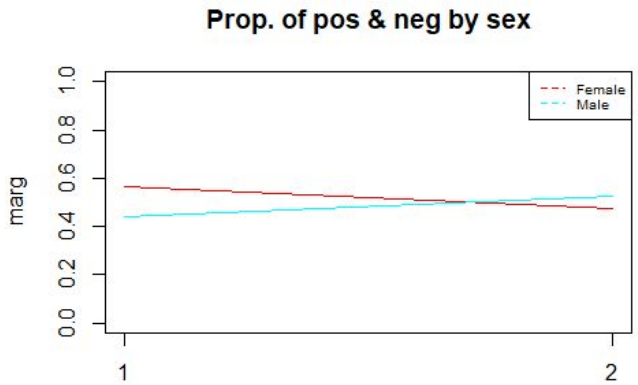


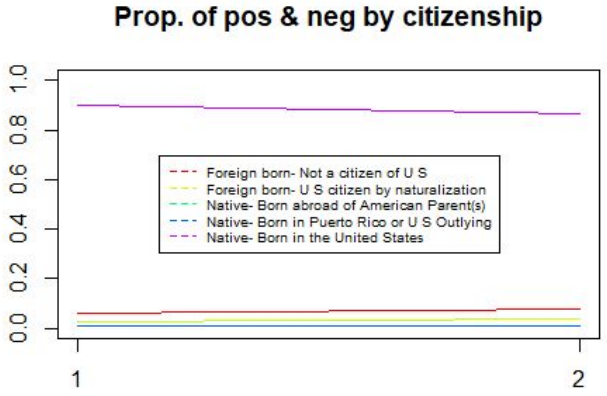
Clustering

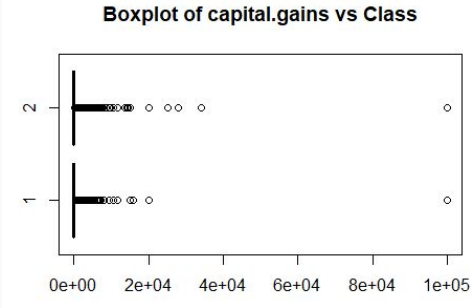


Profiling



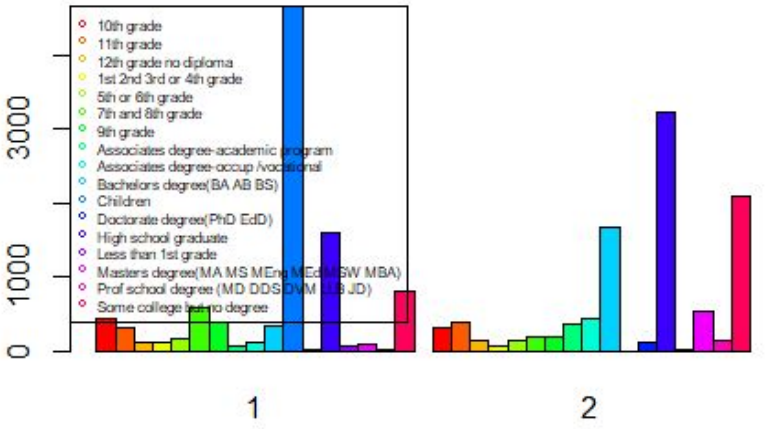






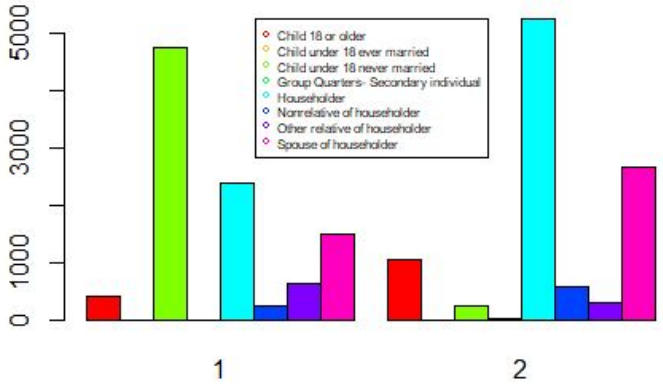
Socially, the American society do not have great difference

Profiling

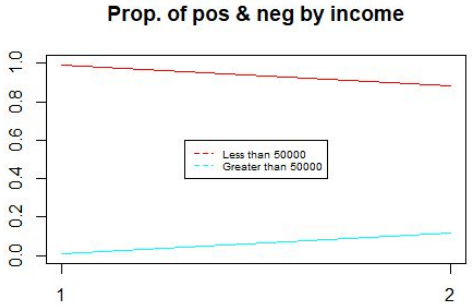


Education

There is a generational difference



Household



Final conclusions

- Two distinct clusters: Workers and non-workers
- Dividends from stocks and capital gains
- Some Categorical variables such as industry are predominantly “not considered”
- Income, individuals with greater than $50,000 present less variability with respect to age
- Individuals who identify as white have a higher wage per hour compared to other races
- The grand majority of individuals have an income of less than $50.000 a significant amount of them are either in the armed forces or are children