MSDS 6372 : Principal Component Analysis

***Glass Identification : Refractive Index (RI) Analysis***

**1. Introduction**

“*Now you see it, now you don't. Glass is a bit of a riddle. It's hard enough to protect us, but it shatters with incredible ease. It's made from opaque sand, yet it's completely transparent. And, perhaps most surprisingly of all, it behaves like a solid material... but it's also a sort of weird liquid in disguise! You can find glass wherever you look: most rooms in your home will have a glass window and, if not that, perhaps a glass mirror... or a glass lightbulb. Glass is one of the world's oldest and most versatile human-created materials.”* Chris Woodford September 17, 2016, <http://www.explainthatstuff.com/glass.html>

Glass is made from a liquid form of sand with a temperature of . When the sand cools, it completely transforms into a different structure that is not quite solid. It becomes a material that scientists refer to as an **amorphous solid**, a cross between a solid and a liquid. Usually other materials are added into the liquid to change its chemical properties based on the purpose of the glass.

Refractive index (RI) determines how much light is bent or refracted when entering an object or in our case glass. The purpose of this study is to understand the different chemical compositions of glass and how these chemicals can affect the refractive index.

**2. Exploratory Analysis**

http://archive.ics.uci.edu/ml/datasets/Glass+Identification

|  |  |
| --- | --- |
| ID | ID number: 1 to 214 |
| RI | Refractive index |
| NA20 | Sodium (unit measurement: weight percent in corresponding oxide, as are attributes 4-10) |
| MG0 | Magnesium |
| AL203 | Aluminum |
| SI02 | Silicon |
| K20 | Potassium |
| CA0 | Calcium |
| BA0 | Barium |
| FE203 | Iron |
| Type | Type of glass |

**3. Validation of assumptions**

Stating our assumptions….

**4. Principal Components Analysis (PCA)**

Principal components analysis….

**5. Regression Analysis of the Principal Components**

Regression analysis of the principal components….

**6. Conclusion**

**Statistical Conclusion** :

**APPENDIX**

**SAS CODE**

|  |
| --- |
| **data** glass;  infile 'glass.csv' dlm=',' firstobs=**2** dsd;  input ID RI NA20 MG0 AL203 SI02 K20 CA0 BA0 FE203 Type ;  **run**;  **proc** **print** data=glass ; **run**; |

**References**

http://www.explainthatstuff.com/glass.html

\*\*\*\*\*\*\*\*\*\*\*\*