Elijah Andrushenko

CPTS 315

Data Mining

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Homework 5

1.

**Iteration 0:**

A = (1, 1)

B = (1.5, 2.0)

C = (3.0, 4.0)

D = (5.0, 7.0)

E = (3.5, 5.0)

F = (4.5, 5.0)

G = (3.5, 4.5)

Euclidean distance (L2 Distance)

K = 2

Cluster Centers:

C1 = B

C2 = C

**Iteration 1:**

B - > C1 = (1.5, 2.0)

C -> C2 = (3.0, 4.0)

A, B -> C1 = (1.2, 1.5)

C, D -> C2 = (4.0, 5.5)

C, D, E -> C2 = (5.75, 5.3)

C, D, E, F-> C2 = (4, 5.25)

C, D, E, F, G-> C2 = (3.9, 5.1)

**Check 1:**

C1 = (1.2, 1.5) -> **1.9**, C2 = (3.9, 5.1) -> **6.4**

A = 1.4 -> **C1** correct

B = 2.5 -> **C1** correct

C = 5 -> **C2** correct

D = 8.6 -> **C2** correct

E = 6.1 -> **C2** correct

F = 6.7 -> **C2** correct

G = 5.7 -> **C2** correct

None were grouped incorrectly on Euclidean distance check thus the result is:

C1 = (A, B)

C2 = (C, D, E, F, G)

2.

COMPAS is a proprietary risk assessment tool that is used by the American, criminal justice system. An article written by investigative journalists from ProPublica published an article that claimed that COMPAS was racially biased. The article lead to debate about the expanding use of algorithmic decision making aids. The debate was just one idea in the big picture of appropriate use of data and statistical methods in society. Many of these issues have been brought up due to new technologies like Artificial intelligence and big data. There have been many risk assessment tools used to assist with several areas of the criminal justice system. While there is an increasing number of tools used for administrative and judicial purposes and decisions, many defendants will only see the end score and none of the calculations or algorithms used to compute said score. Many critics ask for increased transparency when it comes to the development and administration of tools, as it may cut short a defendant’s right to due process. Another issue with lack of transparency would be a possible manipulation of a defendants end score in an attempt to make sentences worse or draw possibly incorrect conclusions. The first generation of risk assessments were in the 1920s and they were based on semi-structured clinical evaluations as an option of treatment for offenders. These did not have statistical mechanism for score validation. By the 1970 it was considered too subjective and had inaccurate predictions. The next risk assessment was regression modeling, which was good for making predictions without needed to understand why certain factors were significant. It focused solely on static historical factors, like age and criminal history. As a result the criminal justice system started to move away from rehabilitation and more towards population management, via incapacitation to minimize threats. This lead to too many problems and thus a third risk assessment was added which took more than just criminal history and age. It also considered intelligence, self-esteem, and psychological. This new model added dynamic factors to what was before just a static model. In conclusion many of the data driven tools we possess will continue to improve and will further help us prevent crime and rehabilitate criminals, as long as we use the correct models, variables, and data analysis.

3. Kate Crawford: Trouble with Bias

Forms of bias, stereotyping, and unfair determinations have been found everywhere from machine learning, vision systems, object recognition, to natural language processing, and word embedding. An example of this would be a system would rate black, gay, or Jewish as negative. While things like straight or white power would get positive ratings. There are somewhere around 1 billion to 2 billion users daily, which is why making sure that these systems work correctly is very important. A potential cure to bias was to neutralize data, unfortunately the problem is much more complex than a simple solution such as that. Structural bias is a social issue first and a technical issue second. We must understand that both of these fields are important thus this is a sociotechnical issue.

First, we answer what bias is. Bias means undue prejudice, in law bias means judgement based on preconceived notions or prejudices. Bias in the real world would be related to the stop and frisk tactic that police used for about a decade, where they would check people to make sure they were obeying the law. 83% of the people who were frisks were black or Hispanic. One conclusion would be that blacks and Hispanics are more likely to commit crimes while, many professors who study American history can trace this all black to system racism. Which then ended up being judged in courts as a form of racial profiling.

Bias produces Harms of allocation. Which is when a system allocates or withholds certain groups of an opportunity or a resource. Harms of allocation plays a role in racial bias, where certain races are labeled incorrectly or have been treated unequally as a result of a system algorithm. Stereotypes are one of the most well-known Harms of allocation, an example would be saying that man is to computer programming as woman is to homemaker. Recognition is another harm of allocation where due to your race the system may not work properly, it would almost seem as if certain somewhere was made for only a specific group of people. Denigration is the third form of a harm of allocation, where negative suggestions or misrepresentations of certain groups are labeled due to algorithms. Under-representation, where a search result would exclude entire groups of people and only have a very specific group of people. There are many technical responses to harms of allocation. One proposal would be to emphasize neutrality, but leads to questions of whose definitions of neutrality is being represented. Classification is always a product of its time, and we are in the biggest experiment of classification in history. Design decisions when it comes to making your system have consequences. An example would be Facebook’s gender dropdown select. Before it was simply 2 gender then it becomes 56 genders. Facebook maintains the dropdown menu for gender selection rather than just adding a blank text field for users to enter in their gender. Data sets affect the culture but also the power hierarchy that they are in. Many of these problems must consider the ethics behind bias and understanding this will help prevent unwanted results and offensive or racist conclusions made by the systems we implement. Hopefully this will help us pursue our goal of fairness in AI systems.