Midterm notes

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- 1st and 4th amendment
    - 4th amendment and 1st amendment are typically used to protect from infringements by the government
    - Public and Private institutions are hold to similar but different standards
    - Schools are exempt from requiring a warrant and probable cause
    - Its been determined that the 4th amendment does apply to public school officials - search simply needs to be "reasonable"
    - Student expectation of privacy must be balanced with the need to maintain an educational environment.
- Ethically significant harms
    - Perpetuate stereotypes
    - Social biases race and discrimination
    - Negative feedback loop
- Ethically significant benefits
    - Moral benefits
    - Reduce racial or sexual bias based an algorithm training

- Law and ethics.
    - Law is a system of rules of conduct defined by a government. Law defines legal rights and duties of people and the means of enforcing these rules
    - Ethics is more about moral principals right or wrong
    - Law and ethics do overlap - what is unethical can also be illegal and what is illegal can be perceived as ethical

- US law types
    - Civil laws - laws used for governing a nation or state
        - Relationships / conflicts that occur between entities and people
        - Defamation, libel, slander breach of contract, negligence resulting in injury or death, property damage
    - Criminal law - violations harmful to society
        - Enforced by state
        - burglary, assault battery and cases of murder
        - Offense against public, society or state
    - Private law - relationships between individuals and organizations
        - Family law, commercial law, labor law

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  - Family law, commercial law, labor law
  - Commercial law - laws around conducting business, individuals, merchants
    - □ Uniform commercial code - sales, leases
    - □ federal, state and international laws
    - □ bookkeeping,bankruptcy
  - Family law
    - □ marriage, adoption divorce, child custody, domestic violence, reproductive rights
  - Labor law
    - □ Fair labor standards act of 1938
    - □ Requires a federal minimum wage
    - □ the Discourages working over 40 hours through time and a half pay,
    - □ Family and medical leave act.
    - □ Not paying overtime, failure to pay the minimum wage, delayed payment
- o Public law
  - concerns structure and administration of government
  - Government agencies and relationships with citizens, employees and other governments
  - Rights to social benefits
  - Us constitution, state constitutions, federal and state statutes, common law, case law, administrative law
  - criminal, administrative and constitutional law
  - Constitutional law
    - □ Relationship between the state and the individual and different branches of the state
  - Administrative law
    - □ Regulates bureaucratic managerial procedures and powers of administrative agencies
  - Criminal law
    - □ Criminal prosecution involves the government -victims of crime can be member of the public

- Regulated domains in law
  - o
    - Cannot use non- financial factors to approve or deny a loan
    - Age **can** be considered
    - ~~Cannot be denied a loan based only on age as long as older than 18~~

crime can be member of the public

- Equal credit opportunity act
  - Cannot use non- financial factors to approve or deny a loan
  - Age **can** be considered
  - Cannot be denied a loanbased only on age as long as older than 18
  - Prohibits decisions based on race, color, religion, national origin, gender, marital status, age
  - Promote availability of credit to all credit worthy applicants
- Education
  - education amendment 1972
    - □ Higher education amendments of 1972
    - □ Title ix - prohibits discrimination on the basis of sex in educational institutions receiving federal aid
    - □ Financial aid to students
    - □ Equal pay act 1963 did not originally cover executives, administrators, outside salespeople - education amendment 1972 amended fair labor standards to expand coverage of the equal pay act
  - Civil rights act 1964
    - □ Desegregation of public education
    - □ D discrimination on the basis of race, color, religion, sex or national origin
    - □ Also forbade for hiring, promoting, firing
    - □ Ended segregation in public places suchas swimming pools, libraries and public schools
- Employment civil rights act 1964
  - Protects employees and job applicants from employment discrimination based on race, color, religion, sex and national origin
- Housing and public accommodation
  - Fair housing act 1968
    - □ Protects people from discrimination wen they are renting or buying a home, getting a mortgage, seeking housing assistance, or other housing-related activities
    - □ Prevent race discrimination.
- Us privacy act 1974
    - □ Rights and restrictions on data held by government agencies.
- Health insurance portability and accountability act (hippa)
  - Healthcare and health insurance personal data protection
- Gramm leach Bliley act GLBA

- children's online privacy protection act (coppa)
  - u Protects information of those 12 and under
- Us privacy act 1974

- Healthcare and health insurance personal data protection
  - Gramm leach Bliley act GLBA
    - Protects financial non personal information
  - children's online privacy protection act (coppa)
    - u Protects information of those 12 and under
  - Us privacy act 1974
    - The right to request and access and connect data
    - the right to access data individual basis)
    - The right to information about data uses
- Discrimination law
  - Federal law prohibits discrimination based on a person's national origin, race, color, religion, disability, sex and familial status,

- Ethical decision making
  - When a decision needs to be made that could benefit one person or group of people but might cause harm to others
  - There are benefits and harms involved din making these decisions - one way to understand is to consider over vital life interests such as food water and shelter + quality of life interests suchas health and happiness - does making a decision hurt are party concerning one of these vitals-

- Code of ethics
  - Standards that cover issues such as respect for others
  - Causing no harm not only through your personal actions
  - ACM code of ethics
    - General ethical principles
      - Contribute to society and human well-being
      - Avoid harm
      - Privacy
      - honest, honor confidentiality
    - Professional responsibilities
      - Maintain high professional competence, conduct and ethical practice
      - Design systems that are robustly and usable secure
      - Foster public awareness and understandingof computing
    - Professional leadership principles
      - Ensure that the public good is the central concern
      - Evaluate fulfillment of social responsibilities
      - Manage personnel and resources to enhance the quality ofworking life
    - Compliance with the code
      - Uphold promote and respect the principles of the code
      - Treat violations of the code as inconsistent with membershipin

- □ Evaluate fulfillment of social responsibilities
- □
  - ~~of working life~~
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    - □ Uphold promote and respect the principles of the code
    - □ Treat violations of the code as inconsistent with membership in the ACM
- ○ Ten Commandments of computer ethics
  - ▪ Not use computer to harm other people
  - ▪ Not interfere with other people's computer work
  - ▪ Not snoop around in other people's computer files
  - ▪ Not use a computer to steal
  - ▪ Not use a computer to bear false witness
  - ▪ Not copy or use proprietary software for which you ou have not paid
  - ▪ Not use other people's computer resources without authorization or proper compensation
  - ▪ Not appropriate other people's intellectual output
  - ▪ Think about the social consequences of the program you are writing or the system you are designing
  - ▪ Always use a computer in ways that ensure consideration and respect for your fellow humans

- Information privacy
- Data privacy - the relationships between the collection and dissemination of data and public expectation of privacy
- Gramm - leach - Bliley Act requires financial institutions that offer consumers financial products or services like loans, financial or investment advice or insurance -to explain their information- sharing practices to their customers and safeguard sensitive data
  - ○ Limit when financial institution may disclose a consumer's non-public personal information to non affiliated third parties
  - ○ Impacted FTC
  - ○ Financial institutions must give their customers a clear and conspicuous written notice the describing their privacy policies and practices
  - ○ Must provide an "initial notice" by the time the customer relationship is established
  - ○ Due notice to request info not be shared with third party
  - ○ Privacy policies are fully disclosed
- The privacy act 1974
  - ○ Code of fair information practices that governs the collection, maintenance. use. and dissemination of information about individuals that
    - ▪ Balance government's need to maintain information about individuals while protecting against unwarranted invasions of privacy

- The privacy act 1974
  -
    - is maintained in systems of records by federal agencies
      - Balance government's need to maintain information about individuals while protecting against unwarranted invasions of privacy
      - Does not apply to deceased persons
  - Difference between HIPPA and privacy act 1974
    - HIPPA app lies to both public and private covered entities - heath plans, healthcare clearinghouses and health care providers
    - Privacy act applies to all federal agencies regardless of heath information function
    - Safeguarding the privacy of individually identifiable health information
- Electronic communications privacy act 1986
  - Regulates interception of wire, electronic and oral communications while they are being made, are in transit and when they are stared in computers
  - emails, telephone conversations, data stored electronically
  - Protects privacy of stared electronic communications before communication is transmitted to the recipient, or if a copy of the message is kept after it is delivered
- Privacy of customer information section of tee common carrier regulation
  - Services are not marketing
  - Carriers cannot disclose info except for providing services
  - Carers are prohibited from disclosing customer information except as required by law or with the customers permission

- Health insurance portability and accountability act of 1996 (hippa)
  - Restrict dissemination of personal health data
  - Protect sensitive patient health information from being disclosed without the patient's consent or knowledge
  - The privacy rule, the security rule, the breach notification rule
  - Protect medical records..

- GDPR eu consent
  - Requires consent to be opt-in
  - consent= freely given, specific, informed and unambiguous given by clear affirmative action
  - not acceptable to assign consent through the data subject's silence or by supplying "pre-ticked boxes" -mostly comes from cookies consent

- Algorithmic bias
- Can lead to self perpetuating truth
- Systematic and repeatable errors that create un fair outcomes

- ○ not acceptable to assign consent through the data subject's silence or by supplying "pre-ticked boxes" -mostly comes from cookies consent

- Algorithmic bias
- Can lead to self perpetuating truth
- Systematic and repeatable errors that create un fair outcomes
- Since algorithms are considered trade secrets they lack sufficient limits and oversight
- So mitigating bias becomes difficult
- Data impacts bias:
  - ○ Data input
    - Data passed in can be incomplete, incorrect or outdated
    - Poor data selection - doesn't fully represent testing pool
    - Since the algorithm was trained on this biased or incomplete data that can perpetuate the biases
    - Humans select the data so any biases they personally hold (conscious or subconscious) bias
    - Need extensive training with different diverse data sets, testing and diverse teams working on the algorithmic model
    - Biases can impact data sets negatively at multiple points in the training process:
      - □ collection, data aggregation, model selection, end user interpretation. -
      - □ collection - - was the data collected in the morning when everyone was cranky or at night wen everyone was tired
      - □ What do we choose to measure and how do we measure it? (Happiness)
    - How does bias affect accuracy?
      - □ Accuracy is a qualitative term - agreement between a measurement made on an object and it's the value
      - □ Bias is a quantitative term describing the difference between the average of measurements made on the subject and it's the value
    - 3 sources of bias in AI: algorithmic prejudice, negative legacy, underestimation
      - □ Negative legacy
        - ◆ Bias already present in data
      - □ Underestimation
        - ◆ Not enough data for the model to make confident conclusions
      - □ Algorithmic prejudice

- ○ Data processing is another way algorithms can be influenced or become

conclusions
- ☐ Algorithmic prejudice
  - ◆ statistic-correlation - don't have access to racial data but have access to zipcode data and there is underlying information correlations that the algorithm is blind to
- ○ Data processing is another way algorithms can be influenced or become more biased

- Quantifying fairness
- Sensitive attributes can be correlated to other attributes
- Its easy to predict sensitive attributes if you have lots of other information
- can't simply remove the sensitive attribute
- Group fairness
  - ○ Statistical parity
    - ▪ Same percentage of people in groups A or B
    - ▪ Error is the same for both groups
- Individual fairness
  - ○ Treat similar examples similarity - similar people get similar outcomes

- Statistics
- Quantitative data is number based, countable, or measureable
- Qualitative data is interpretation- based, descriptive and relating to language
- Descriptive analytics
  - ○ organizing, summarizing and presenting data
  - ○ Frequency table
  - ○ .histogram.
  - ○ mean, variance
- Inferential analytics
  - ○ Methods used to determine something about a population based on a sample
  - ○ Averages
- Continuous - values belonging to the set can take on any value within a finite or infinite interval
  - ○ Measured [0,70].
  - ○ Interval
  - ○ Height of a child
  - ○ Length of a leaf
  - ○ Speed of a train
- discrete - values belonging to the set are distinct and separate

  - ○ Number of languages spoken
  - ○ Number of books on a shelf
  - ○ Number of people in a family

- o Speed of a train
- discrete - values belonging to the set are distinct and separate
  - o Counted { 1,2,3, 4,56}
  - o Number of languages spoken
  - o Number of books on a shelf
  - o Number of people in a family.
  - o categorical
- Ordinal or rank data
  - o In order data but no necessarily equal (abcd)
  - o Qualitative (non-numeric data)
  - o Groups variables into descriptive categories
  - o Categories used are ordered on some kind of hierarchical scale(high, low)
  - o Education level (bachelors, masters)
  - o Seniority level (junior, mid, senior)
  - o School letter grades
  - o Likert scale (satisfied, neutral, dissatisfied)
  - o Age (teenager, child, retiree).
  - o Demographic info
  - o Frequency distribution
  - o Measures of central tendencies imean, mode)
  - o Measures of variability (range)
- Cross sectional data - observations of many different individuals (subjects, objects) at a given time, each observation belonging to a different individual
  - o Opening prices of a share over half a year
- time-series data
  - o Seasonal variations
  - o Cyclical fluctuations
- Descriptive analytics examples
  - o Course enrollments
  - Summonsing the number of times a learner posts Ina discussion board
  - Comparing pre and post test assessments.
- Inferential analytics
  - Hypothesis testing
  - Confidence testing
  - Randomly select a sample of 11th graders in a state and collect data on their sat scores and other characteristics - hypothesis testing
- quasi-experimental
  - Similar to randomized trials but do not use randomization
  - Aim to demonstrate causality between an intervention and an outcome
  - Studying specific classrooms of students to determine certain learning

- Sampling error
  - Indicator of level of confidence

- Similar to randomized trials but do not use randomization
  - Aim to demonstrate causality between an intervention and an outcome
  -
    outcomes
- Sampling error
  - Indicator of level of confidence
  - Not caused by observing a sample instead of the whole population
- Calculating mean median mode
  - mean-add and divide by total number of items
  - median- order numbers smallest to largest, find middle number
  - mode-most frequently occurring number
  - Range - take largest number and subtract smallest
- Calculating variance
  - Measurement of spread between numbers in data set
  - How far each number in the set is from the mean and thus from every other number in the set
  - Calculate mean of data
  - Find each data point's difference from the mean value
  - Square each value
  - Add up all squares
  - Divide sum of squares by n-1 (for a sample) and N (for a population) '
- Consequence - based reasoning recognizes that lying usually produces bad consequences
- rule-based ethics says lying is always wrong
  - Companies often include discrimination policies into the employee handbook
  - In keeping with the goal of consequence ethics, zero tolerance for any form of discrimination against employees protects individuals while promoting the greater good of the workplace community
  - Rules -base- using is always wrong black or white reasoning
- Standard deviation
- Find mean
- For each data point, find the square of its distance to the mean
- Sum the values from step z 2
- Divide by the number of data points
- Take square root
- Calculating quartile
- Order numbers smallest to largest
- q 1 = 1 (n+1)*1/4
- Q2 = (n+1)*2/4
- Q3 =(n+1)*3/4
- Interquartile range – q3 q1
- Interquartile range tells you the spread of the middle half of your distribution

- Q2 = (n+1)*2/4
- Q3 =(n+1)*3/4
- Interquartile range – q3-q1
- Interquartile range tells you the spread of the middle half of your distribution

Data	$x_i - \bar{x}$	$x_i - \bar{x}^2$
5	-4	16

$$s^2 = \frac{\Sigma_i (x_i - \bar{x})^2}{n-1}$$