Weekly report of lessons

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The topics covered: Bayesian inference , Maximum a Posteriori (MAP) , Maximum Likelihood hypothesis,Minimum mean square error (MMSE) , Gibbs algorithm , Naive Bayes Classifier, Bayesian network

Summary topic wise :

- Bayesian inference is just the process of deducting properties about a probability distribution from data using Bayes' theorem.It works as : we have a prior belief about something and then we receive some data. We can update your beliefs by calculating the posterior distribution. Afterwards, we get even more data. So our posterior becomes the new prior. This cycle can continue indefinitely.
  $P(h/D) = \frac{P(h)\,P(D/h)}{P(D)}$, where D is the data
- Maximum a posteriori (MAP) hypothesis selects a single most likely hypothesis given the data. The hypothesis prior is still used and the method is often more tractable than full Bayesian learning .We can make the relationship between MAP and machine learning clearer by re-framing the optimization problem as: $argmax\{\ P(D/h)\ P(h)\ \}\ \ \forall\ h \in H$
- In Maximum Likelihood (ml) Estimation, we wish to maximize the probability of observing the data from the joint probability distribution given a specific probability distribution and its parameters, stated formally as:
  $h_{ml} \equiv argmax\ \{P(D/h)\ \}\ \ \forall h\ \in H$
- We define 3 terms in bayesian inference for concept learning , $P(D/h)$ as likelihood , which is 1 if h is an element of version space and 0 otherwise. $P(h)$ as prior which takes uniform value from distribution . $P(D)$ marginal probability of data , which is $\sum_h P(D/h)\ .\ P(h)$
- The MMSE estimator is given by the posterior mean of the parameter to be estimated.
  $MSE = \sum_{i=1}^{n} (\ y_i - h(x_i))^2$
- Naive Bayes is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature . Given as:
  $P(X/C_i)\ =\ \prod_{k=1}^{n} P(x_k/C_i) = P(x_1/C_i)\ *P(x_2/C_i)\ *\ .....\ *\ P(x_n/C_i)$
  For categorical or discrete values , we use the fraction of times the value occurred in a class.For Continuous variable may use parametric modeling of gaussian distribution.
- Bayesian networks aim to model conditional dependence, and therefore causation, by representing conditional dependence by edges in a directed graph.It is a DAG in which each edge corresponds to a conditional dependency, and each node corresponds to a unique random variable. If X is a Bayesian network with respect to G if its joint probability density function can be written as a product of the individual density functions, conditional on their parent variables : $P(X) = \prod_{i=1}^{d} P(X_i/parent\ of\ X_i)$

Any novel idea of yours out of the lessons : We could use Naive Bayes in social media classification of spam and non spam user specially in platform like twitter where a lot of fake trends are made .
Difficulty level of the Second Quiz : Fair
Did you find the quiz to be too lengthy : Yes .
Did the quiz questions enhance your understanding of the topics covered : Yes , the questions were good but were lengthy , therefore it took time to interpret the data given in the question . Some of the theoretical question were conceptual too.

<Mid-Term Feedback >

Do you read textbooks to learn the topics (if yes name the book)?

-Yes, if i get struck at some point ,I refer to the textbook. I refer machine learning book by Tom mitchell

Do you find slide sets sufficient to learn the topics?

-The slides are not sufficient as it can not contain all contents of the book , especially in subjects like ML .So, I have to refer to the book or the internet .

Rate the speed of coverage of content: Slow / Appropriate / Fast

- The rate is appropriate .

Name the topics already known to you and may not require elaboration:

-I was acquainted with the topics like decision tree , bayes theorem as a masters student and after that the topic seems new to me

Name the topics that should have been covered for better understanding:

-None

Rate the overall technical content of the topics covered so far: Low / Moderate / High

-Moderate

Rate your overall understanding of the topics covered: Poor / Fair / Good / Excellent

-Good

Was the time given for doing the assignment sufficient <If no mention which part took most of your time>

- Yes , the time given was sufficient .

How many assignments do you think would be appropriate given your experience with the first assignment?

-Given the constraint of such a short semester utmost three(3) would be good.

Which mode do you prefer? classroom teaching / online teaching

- Of Course the classroom could never replace online teaching as the student teacher interaction is more and on the board when someone teaches it is relatively easy to relate up the concepts as many things are written on board and the teacher could specifically point to what he/she is referring to.

Any other suggestions?

-None