Assignment 3: Bayesian Inference, Temporal State Estimation and Decision Making under Uncertainty

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Problem 1:

a

The probability that all five of the Boolean variables are simultaneously true is:
$P(A) = 0.2$
$P(B) = 0.5$
$P(C) = 0.8$
$P(D) = 0.1$
$P(E) = 0.3$
$P(A, B) = 0.1$
$P(A, B, C) = 0.08$
$P(A, B, C, D) = 0.008$
$P(A, B, C, D, E) = 0.0024$

b

The probability that all five of the Boolean variables are simultaneously false is:
$P(\neg A) = 0.8$
$P(\neg B) = 0.5$
$P(\neg C) = 0.2$
$P(\neg D) = 0.9$
$P(\neg E) = 0.2$
$P(\neg A, \neg B) = 0.4$
$P(\neg A, \neg B, \neg C) = 0.08$
$P(\neg A, \neg B, \neg C, \neg D) = 0.072$
$P(\neg A, \neg B, \neg C, \neg D, \neg E) = 0.0144$

c

Problem 2:

a

b

c

Problem 3:

a

b

c

Problem 4:

a

b

c

d

Problem 5 - Programming Component:

a

b

c - Generating Ground Truth Data

d - Filtering and Viterbi Algorithms in Large Maps

e

f

g

h - Computational Approximations