Bookmarks

- Unit 0: Overview
- Entrance Survey
- Unit 1: Probability models and axioms
- Unit 2: Conditioning and independence

Unit overview

Lec. 2: Conditioning and Bayes' rule
Exercises 2 due Feb 2, 2017 20:59 ART

Lec. 3: Independence
Exercises 3 due Feb 2, 2017 20:59 ART

Solved problems

Problem Set 2
Problem Set 2 due Feb 2, 2017 20:59 ART

- Unit 3: Counting

Unit 2: Conditioning and independence > Problem Set 2 > Problem 2 Vertical: A reliability problem

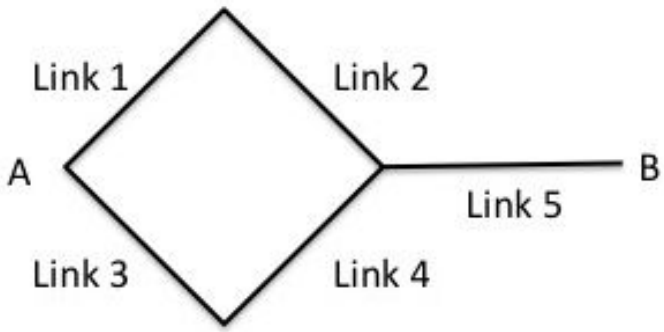
Problem 2 Vertical: A reliability problem

Bookmark this page

Problem 2: A reliability problem

4/4 points (graded)

Consider the communication network shown in the figure below and suppose that each link can fail with probability p. Assume that failures of different links are independent.



1. Assume that $p = 1/3$. Find the probability that there exists a path from A to B along which no link has failed. (Give a numerical answer.)

0.4609 ✔

2. Given that exactly one link in the network has failed, find the probability that there exists a path from A to B along which no link has failed. (Give a numerical answer.)

0.8 ✔

Submit You have used 1 of 2 attempts

✔ Correct (4/4 points)

DISCUSSION

Click “Show Discussion" below to see discussions on this problem.

Discussion

Topic: Unit 2/Problem Set 2 / A reliability problem

Hide Discussion

Add a Post

All Posts

What's wrong about this thougt

discussion posted 5 days ago by **GuusKoning**

If you know that exactly one link failed, then for getting no path, that link has to be number 5. That link has a change of 1/3 to get failed. In all other occasions there's a path, so the probability much be 1-1/3=2/3

This post is visible to everyone.

Add a Response

1 response

papastauf

5 days ago

Once you know that exactly one link has failed, the a priori probabilities of failure must be updated. Now you know that one link has failed and four links have not failed. Since the a prior unconditional probabilities of failure were the same for each link, the conditional probabilities of failure for each link in the new conditional universe must also be uniform. What are those probabilities?

Think about your new sample space, in which you know that exactly one link has failed.What happens to the probability of failure of the other links? How many possibilities of the total (the sample space itself) would lead the system works? Hope it helps.

posted 4 days ago by **Schots**

Not sure I understand these responses. In particular, why should the prior probabilites of each link's failure be updated given that one has already failed. Is the probability of failure in this case not an intrinsic property of the link itself rather than our belief about its failure rate? Are you suggesting that 5x1/3 should now be allocated over the remaining 4 links? Doesn't seem intuitive to me, but I'm learning not to necessarily trust my intuition.

posted 3 days ago by **DJamesW**

@papastauf and @Schauts ... Thanks for clarifying my thinking on this. Question 2 is actually quite straightforward.

posted 2 days ago by **soloke**

@papastauf.. Nice explaination.. I couldn't have explained any better..

posted a day ago by **lakshmikant**

Thanks @soloke (and others); gave me encouragement to go with first impression! Didn't see it as a re-allocation of priors but I suppose it was. In other words intuition won in this case.

posted a day ago by **DJamesW**

Looks like we don't need to calculate the probability of failure of the links. We just need to count how many scenarios there are with exactly one failed link, and of these how many would satisfy the requirement. As all scenarios should have the same probability there should be no need to do any calc's?

posted a day ago by **Alfred2014**

Add a comment

Showing all responses

Add a response:

Preview

Submit


Download on the
App Store
ANDROID APP ON
Google play