SES598: Space Robotics and AI, Assignment 0, Least-squares and Probability theory

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1. Age and spatial spread of the islands and seamounts of Hawaii are considered to be drawn from a linear model, corrupted by additive Gaussian noise. The chain of these Hawaii islands/seamounts was formed by the movement of the Pacific Plate, over a volcanic hotspot. A dataset is provided with each row having island/seamount ID, name, distance in kilometers to the Kilauea volcano, and island age in million years. Write

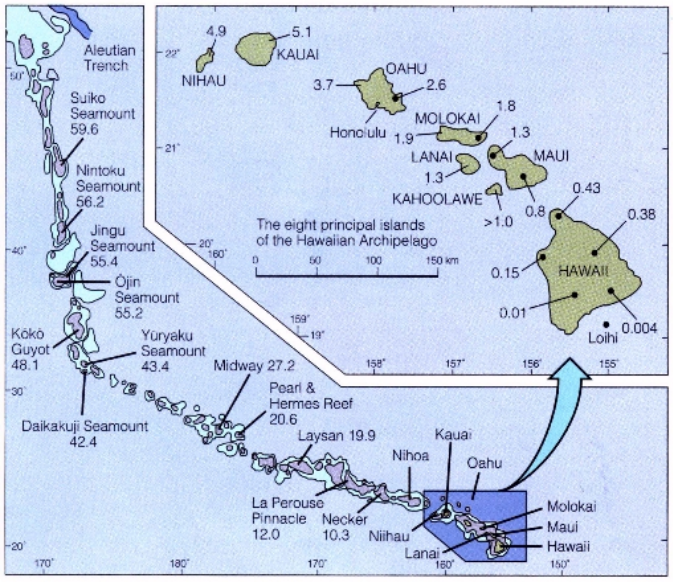

Figure 1: Hawai islands and seamounts were formed by volcanic eruptions, as the Pacific Plate moved very slowly. Courtesy: Kenneth Hon, University of Hawaii, Hilo

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Python code to compute least-squares estimate the Pacific Plate drift velocity using the available dataset. The units will be kilometers per million

years. Can you comment on how good this estimate is? You can share your solution in Google Colaboratory, or as a single Python file. The dataset can be downloaded from the link provided below.
Resources:
1) Dataset
2) "How Did Hawaii Form?" – Scientific American, Kelsey Kennedy, May 30, 2018
3) Google Collaboratory

2. A student answers a multiple choice examination question that has 4 possible answers. Suppose that the probability that the student knows the answer to the question is 0.75 and the probability that the student guesses is 0.25.
(i) What is the probability that the question is answered correctly?
(ii) If it is answered correctly what is the probability that the student really knew the correct answer?