校选题目中文版

无人机搜索失踪徒步旅行者

背景

山地救援无人机公司（MRDC）是一家专注于使用无人机进行山区救援行动的企业。他们的无人机能够快速部署到偏远地区，搜索失踪的徒步旅行者。一架无人机被派往山区执行搜索任务，但由于恶劣天气或机械故障，可能与控制中心失去通信或失去动力。MRDC 现在需要通过制定安全程序来获得监管机构的批准，以确保在无人机失联时能够迅速定位并救援。

现需要建立一个模型来预测无人机随时间变化的位置。与在平坦地形进行的典型搜索不同，发生故障的无人机可能会坠毁在山谷、森林或陡峭地形中。它的位置可能进一步受到风力、降雨、地形起伏和植被覆盖的影响。你们的任务是：

定位 —— 开发一个模型，预测无人机随时间变化的位置。

与这些预测相关的不确定性因素是什么？

无人机可以定期向控制中心发送哪些信息，以在事故发生前减少这些不确定性？无人机需要什么样的设备才能做到这一点？

准备 —— 如有条件，你们会建议公司在控制中心携带哪些额外的搜索设备，以便在必要时部署？您可以考虑不同类型的设备（如备用无人机、传感器

等），但必须考虑与该设备的可用性、维护、预备情况和使用相关的成本。如有必要，救援队可能需要携带哪些额外设备来提供协助？

搜索 —— 开发一个模型，该模型将使用你们的位置模型中的信息来推荐设备的初始部署点和搜索模式，以便最大限度地缩短定位失联无人机的时间。确定找到无人机的概率作为时间和累积搜索结果的函数。

推断 —— 如何将你们的模型扩展到如森林或沙漠等其他地形？你们的模型将如何改变以考虑在同一区域内移动的多个无人机？

准备一份不超过 25 页的报告，提供您的计划的详细信息。附上一份两页的致山地救援管理机构的报告备忘录，以帮助赢得批准。

您的 PDF 解决方案总页数不得超过 25 页，应包括：

- 一页摘要页。
- 目录。
- 完整解决方案。

★论文格式要求与须知★

1. 论文按科技论文的格式用**英文**撰写， 由题目，摘要，关键词，正文，参考文献等部分构成，A4纸，不超过25页。 如果有编写的程序，不需要附在论文中，请先自行保存， 后期有要求再提交（不能按要求提交的按不合格处理）。
2. 论文正文字体Times New Roman, 字号12pt. 其他部分的字体，字号不做要求。
3. 论文封面写小组成员姓名（中文+汉语拼音）。
4. 2025年12月6日（周六）上午9:30-11:30提交纸质版论文，具体安排请关注群消息。

校选题目英文版

Search for a Missing Hiking Drone

Background

Mountain Rescue Drone Company (MRDC) is an enterprise specializing in using drones for mountain rescue operations. Their drones can be quickly deployed to remote areas to search for missing hikers. When a drone is dispatched to a mountainous area for a search mission, it may lose communication with the control center or lose power due to severe weather or mechanical failure. MRDC now needs to obtain regulatory approval by establishing safety procedures to ensure that lost drones can be quickly located and rescued.

They specifically want you to develop a model to predict the drone's position over time. Unlike typical searches conducted on flat terrain, a malfunctioning drone may crash in valleys, forests, or steep terrain. Its position may be further influenced by wind, rainfall, terrain variations, and vegetation coverage. Your tasks are:

Localization — Develop a model to predict the drone's position over time.

What are the uncertainties associated with these predictions?

What information can the drone regularly send to the control center to reduce

these uncertainties before an accident occurs? What equipment does the drone need to achieve this?

Preparation — If conditions permit, what additional search equipment would you recommend the company to have at the control center for deployment when necessary? You may consider different types of equipment (such as backup drones, sensors, etc.), but must account for the costs associated with the equipment's availability, maintenance, readiness, and usage. If necessary, what additional equipment might rescue teams need to carry to assist?

Search — Develop a model that uses information from your position model to recommend initial deployment points and search patterns for the equipment, in order to minimize the time required to locate the lost drone. Determine the probability of finding the drone as a function of time and cumulative search results.

Extrapolation — How can your model be extended to other terrains, such as forests or deserts? How would your model adapt to account for multiple drones moving within the same area?

Prepare a report not exceeding 25 pages, providing detailed information about your plan. Include a two-page memorandum report addressed to the Mountain Rescue Management Agency to help secure approval.

Your PDF solution must not exceed 25 pages in total and should include:

- A one-page summary.
- A table of contents.
- The complete solution

★论文格式要求与须知★

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2. 论文正文字体Times New Roman，字号12pt. 其他部分的字体，字号不做要求。
3. 论文封面写小组成员姓名（中文+汉语拼音）。
4. 2025年12月6日（周六）上午9:30-11:30提交纸质版论文，具体安排请关注群消息。