2024 ICM
Problem E: Sustainability of Property Insurance

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Extreme-weather events are becoming a crisis for property owners and insurers. The world has endured "more than $1 trillion in damages from more than 1,000 extreme-weather events in recent years."[1] The insurance industry saw claims for natural disasters in 2022 increase by "115% compared to the 30-year average."[1] Conditions are expected to get worse as losses from severe weather-related events are likely to increase due to floods, hurricanes, cyclones, droughts, and wildfires. Premiums for insurance coverage are rising quickly, with climate change fueling projected increases of 30-60% by 2040.[1]

Property insurance is not only getting more expensive, but also harder to find, as insurance companies change how and where they are willing to **underwrite** policies. The weather-related occurrences propelling the cost of property insurance premiums look different depending on where you are in the world. Additionally, the **insurance protection gap** averages 57% worldwide and is increasing.[2] This highlights the industry's dilemma - the emerging crisis in profitability for the insurers and in affordability for the property owners.

COMAP's **I**nsurance of **C**atastrophes **M**odelers (**ICM**) are interested in the sustainability of the property insurance industry. As climate change increases the likelihood of more severe weather and natural disasters, ICM wants to determine how best to posture property insurance now such that there is resilience in the system to cover the cost of future claims while also ensuring long-term health of insurance companies. If insurance companies are unwilling to underwrite policies in too many cases, they will go out of business due to too few customers. Conversely, if they underwrite policies that are too risky, they may pay too many claims. Under what conditions should insurance companies underwrite policies? When should they choose to take the risk? Is there anything a property owner could do to influence this decision? Develop a model for insurance companies to determine if they should underwrite policies in an area that has a rising number of extreme weather events. Demonstrate your model using two areas on different continents that experience extreme weather events.

As we look to the future, communities and property developers need to be asking themselves how and where to build and grow. As the insurance landscape changes, future real-estate decisions must be made to ensure properties are more resilient and built deliberately, including the viability to offer appropriate services to growing communities and populations. How can your insurance model be adapted to assess where, how, and whether to build on certain sites?

There may be communities where your insurance model recommends against underwriting current or future property insurance policies. This may result in community leaders facing tough decisions about properties with cultural or community significance. For example, the Cape Hatteras Lighthouse was moved on the Outer Banks of North Carolina to protect this historic light house along with the local tourism industry centered around it.[3] As a community leader, how could you identify buildings in a

2024 ICM 问题 E：财产保险的
可持续性

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极端天气事件正在成为业主和保险公司的危机。近年来，世界遭受了"1000多起极端天气事件造成的超过1万亿美元的损失"。保险业在 2022 年对自然灾害的索赔"与 30 年平均水平相比增加了 115%"。由于洪水、飓风、飓风、干旱和野火，与恶劣天气相关的事件造成的损失可能会增加，预计情况会变得更糟。保险费正在迅速上涨，气候变化推动预计到 2040 年将增长 30-60%。

财产保险不仅越来越贵，而且越来越难找到，因为保险公司改变了他们愿意承保保单的方式和地点。推动财产保险费成本的天气相关事件看起来不同，具体取决于您在世界的哪个地方。此外，全球保险保障缺口平均为57%，并且还在不断扩大。这凸显了该行业的困境——保险公司的盈利能力和业主的负担能力危机正在出现。

COMAP的巨灾保险建模师（ICM）对财产保险业的可持续性感兴趣。随着气候变化增加了更恶劣天气和自然灾害的可能性，ICM希望确定现在如何最好地安排财产保险，以便系统具有弹性，以支付未来的索赔成本，同时确保保险公司的长期健康。如果保险公司不愿意在太多情况下承保保单，他们就会因为客户太少而倒闭。相反，如果他们承保风险太大的保单，他们可能会支付太多的索赔。保险公司应该在什么条件下承保保单？他们什么时候应该选择承担风险？业主可以做些什么来影响这个决定吗？为保险公司开发一个模型，以确定他们是否应该在极端天气事件数量不断增加的地区承保保单。使用经历极端天气事件的不同大陆上的两个区域来演示您的模型。

当我们展望未来时，社区和房地产开发商需要问自己如何以及在哪里建设和发展。随着保险格局的变化，未来的房地产决策必须做出，以确保物业更具弹性并经过深思熟虑的建造，包括为不断增长的社区和人口提供适当服务的可行性。如何调整您的保险模型，以评估在某些地点、如何以及是否在某些地点建造？

在某些社区中，您的保险模式建议不要承保当前或未来的财产保险单。这可能会导致社区领导人面临对具有文化或社区意义的财产的艰难决定。例如，哈特拉斯角灯塔被移至北卡罗来纳州的外滩，以保护这座历史悠久的灯塔以及以它为中心的当地旅游业。作为社区领袖，您如何识别建筑物

community that should be preserved and protected due to their cultural, historical, economic, or community significance? Develop a preservation model for community leaders to use to determine the extent of measures they should take to preserve buildings in their community.

Select a historic landmark – not Cape Hatteras Lighthouse – that is in a location that experiences extreme weather events. Apply your insurance and your preservation models to assess the value of this landmark. Compose a one-page letter to the community recommending a plan, timeline, and cost proposal for the future of their treasured landmark considering the insight you have gained from the results of your insurance and preservation models.

Your PDF solution of no more than 25 pages total should include:
- One-page summary sheet that clearly describes your approach to the problem and your most important conclusions from your analysis in the context of the problem.
- Table of Contents.
- Your complete solution.
- One-page community letter.
- AI Use Report (if used).

Note: There is no specific required minimum page length for a complete ICM submission. You may use up to 25 total pages for all your solution work and any additional information you want to include (for example: drawings, diagrams, calculations, tables). Partial solutions are accepted. We permit the careful use of AI such as ChatGPT, although it is not necessary to create a solution to this problem. If you choose to utilize a generative AI, you must follow the COMAP AI use policy. This will result in an additional AI use report that you must add to the end of your PDF solution file and does not count toward the 25 total page limit for your solution.

References

[1] Boston Consulting Group. (2023, December 4). An Insurance Risk Framework for Climate Adaptation. Retrieved at: https://www.bcg.com/publications/2023/an-insurance-risk-framework-for-climate-adaptation

[2] Munich RE. (2022, January 10). Hurricanes, cold waves, tornadoes: Weather disasters in USA dominate natural disaster losses in 2021. Retrieved at: https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2022/natural-disaster-losses-2021.html

[3] Union of Concerned Scientists. (2016, July 19). Saving an Icon: Moving the Cape Hatteras Lighthouse Away from the Shifting Shoreline. Retrieved at: https://www.ucsusa.org/resources/moving-cape-hatteras-lighthouse-away-shifting-shoreline

Glossary

Insurance Protection Gap: the difference in protection coverage between economic losses brought about by natural disasters and the amount of those losses that are covered.

Underwrite: accept liability for, thereby guaranteeing payment in the case of loss or damage.

您如何确定社区中因其文化、历史、经济或社区意义而应该保存和保护的建筑物？为社区领导人制定保护模型，以确定他们应该采取的措施保护社区建筑物的程度。

选择一个历史地标 – 而不是哈特拉斯角灯塔 – 它位于经历极端天气事件的位置。应用您的保险和保护模型来评估这个地标的价值。写一封一页纸的信给社区，考虑到您从保险和保存模型的结果中获得的洞察力，为他们珍贵的地标的未来推荐计划、时间表和成本建议。

总页数不超过 25 页的 PDF 解决方案应包括：
- 一页摘要表，清楚地描述了您解决问题的方法以及您在问题上下文中分析得出的最重要结论。

- 目录。
- 您的完整解决方案。
- 一页的社区信函。
- AI 使用报告（如果使用）。

注意：完整的ICM提交没有具体的最小页面长度要求。您最多可以使用 25 页来完成所有解决方案工作以及要包含的任何其他信息（例如：图纸、图表、计算、表格）。接受部分解决方案。我们允许谨慎使用 ChatGPT 等 AI，尽管没有必要为此问题创建解决方案。如果您选择使用生成式 AI，则必须遵循 COMAP AI 使用策略。这将导致一个额外的 AI 使用报告，您必须将其添加到 PDF 解决方案文件的末尾，并且不计入解决方案的 25 页总页数限制。

引用

[1] 波士顿咨询集团。（2023 年 12 月 4 日）。气候适应的保险风险框架。检索于：https://www.bcg.com/publications/2023/an-insurance-risk-framework-forclimate-adaptation

[2] 慕尼黑 RE.（2022 年 1 月 10 日）。飓风、寒潮、龙卷风：2021 年，美国的天气灾害在自然灾害损失中占主导地位。检索于：https://www.munichre.com/en/company/mediarelations/media-information-and-corporate-news/media-information/2022/natural-disaster-losses2021.html

[3] 忧思科学家联盟。（2016 年 7 月 19 日）。拯救一个图标：将哈特拉斯角灯塔从不断变化的海岸线移开。检索于：https://www.ucsusa.org/resources/movingcape-hatteras-lighthouse-away-shifting-shoreline

词汇表

保险保障缺口：自然灾害造成的经济损失与承保损失金额之间的保障范围差额。

承保：承担责任，从而保证在发生损失或损坏时支付。

Use of Large Language Models and Generative AI Tools in COMAP Contests

This policy is motivated by the rise of large language models (LLMs) and generative AI assisted technologies. The policy aims to provide greater transparency and guidance to teams, advisors, and judges. This policy applies to all aspects of student work, from research and development of models (including code creation) to the written report. Since these emerging technologies are quickly evolving, COMAP will refine this policy as appropriate.

Teams must be open and honest about all their uses of AI tools. The more transparent a team and its submission are, the more likely it is that their work can be fully trusted, appreciated, and correctly used by others. These disclosures aid in understanding the development of intellectual work and in the proper acknowledgement of contributions. Without open and clear citations and references of the role of AI tools, it is more likely that questionable passages and work could be identified as plagiarism and disqualified.

Solving the problems does not require the use of AI tools, although their responsible use is permitted. COMAP recognizes the value of LLMs and generative AI as productivity tools that can help teams in preparing their submission; to generate initial ideas for a structure, for example, or when summarizing, paraphrasing, language polishing etc. There are many tasks in model development where human creativity and teamwork is essential, and where a reliance on AI tools introduces risks. Therefore, we advise caution when using these technologies for tasks such as model selection and building, assisting in the creation of code, interpreting data and results of models, and drawing scientific conclusions.

It is important to note that LLMs and generative AI have limitations and are unable to replace human creativity and critical thinking. COMAP advises teams to be aware of these risks if they choose to use LLMs:

- Objectivity: Previously published content containing racist, sexist, or other biases can arise in LLM-generated text, and some important viewpoints may not be represented.
- Accuracy: LLMs can 'hallucinate' i.e. generate false content, especially when used outside of their domain or when dealing with complex or ambiguous topics. They can generate content that is linguistically but not scientifically plausible, they can get facts wrong, and they have been shown to generate citations that don't exist. Some LLMs are only trained on content published before a particular date and therefore present an incomplete picture.
- Contextual understanding: LLMs cannot apply human understanding to the context of a piece of text, especially when dealing with idiomatic expressions, sarcasm, humor, or metaphorical language. This can lead to errors or misinterpretations in the generated content.
- Training data: LLMs require a large amount of high-quality training data to achieve optimal performance. In some domains or languages, however, such data may not be readily available, thus limiting the usefulness of any output.

在COMAP竞赛中使用大型语言模型和生成式AI工具

这项政策的动机是大型语言模型（LLMs）和生成式人工智能辅助技术的兴起。该政策旨在为团队、顾问和评委提供更大的透明度和指导。本政策适用于学生工作的各个方面，从模型的研究和开发（包括代码创建）到书面报告。由于这些新兴技术正在迅速发展，COMAP将酌情完善这一政策。

团队必须对他们使用 AI 工具的所有情况开诚布公。一个团队及其提交越透明，他们的工作就越有可能被其他人完全信任、欣赏和正确使用。这些披露有助于理解智力工作的发展和对贡献的正确承认。如果没有对人工智能工具的作用进行公开和明确的引用和参考，有问题的段落和作品更有可能被认定为抄袭并被取消资格。

解决问题不需要使用人工智能工具，尽管允许负责任地使用它们。COMAP认识到生成式人工智能作为生产力工具的价值LLMs，可以帮助团队准备提交；例如，在总结、释义、语言润色等时，为结构产生初步想法。在模型开发中，有许多任务需要人类的创造力和团队合作，而依赖人工智能工具会带来风险。因此，我们建议在将这些技术用于模型选择和构建、协助创建代码、解释模型的数据和结果以及得出科学结论等任务时要谨慎。

需要注意的是，LLMs生成式人工智能有局限性，无法取代人类的创造力和批判性思维。COMAP建议团队在选择使用LLMs以下方法时注意这些风险：

- 客观性：以前发布的内容包含种族主义、性别歧视或其他偏见可能会出现在生成的文本中 LLM，并且可能无法代表一些重要的观点。
- 准确性：LLMs可以"产生幻觉"，即产生虚假内容，尤其是在其领域之外使用或处理复杂或模棱两可的主题时。他们可以生成在语言上但在科学上不合理的内容，他们可能会弄错事实，并且它们已被证明可以生成不存在的引文。有些人LLMs只接受过特定日期之前发布的内容的培训，因此呈现出不完整的画面。

- 语境理解：LLMs不能将人类的理解应用于一段文本的上下文，尤其是在处理惯用语、讽刺、幽默或隐喻语言时。这可能会导致生成的内容出现错误或误解。

- 训练数据：LLMs需要大量高质量的训练数据才能达到最佳性能。然而，在某些领域或语言中，这些数据可能不容易获得，从而限制了任何输出的有用性。

Guidance for teams

Teams are required to:

1. **Clearly indicate the use of LLMs or other AI tools in their report,** including which model was used and for what purpose. Please use inline citations and the reference section. Also append the <u>Report on Use of AI</u> (described below) after your 25-page solution.
2. **Verify the accuracy, validity, and appropriateness** of the content and any citations generated by language models and correct any errors or inconsistencies.
3. **Provide citation and references, following guidance provided here.** Double-check citations to ensure they are accurate and are properly referenced.
4. **Be conscious of the potential for plagiarism** since LLMs may reproduce substantial text from other sources. Check the original sources to be sure you are not plagiarizing someone else's work.

**COMAP will take appropriate action
when we identify submissions likely prepared with
undisclosed use of such tools.**

Citation and Referencing Directions

Think carefully about how to document and reference whatever tools the team may choose to use. A variety of style guides are beginning to incorporate policies for the citation and referencing of AI tools. Use inline citations and list all AI tools used in the reference section of your 25-page solution.

Whether or not a team chooses to use AI tools, the main solution report is still limited to 25 pages. If a team chooses to utilize AI, following the end of your report, add a new section titled <u>Report on Use of AI</u>. This new section has no page limit and will not be counted as part of the 25-page solution.

Examples (this is *not* exhaustive – adapt these examples to your situation):

<u>**Report on Use of AI**</u>

1. OpenAI *ChatGPT* (Nov 5, 2023 version, ChatGPT-4)
   Query1: *<insert the exact wording you input into the AI tool>*
   Output: *<insert the complete output from the AI tool>*

2. OpenAI *Ernie* (Nov 5, 2023 version, Ernie 4.0)
   Query1: *<insert the exact wording of any subsequent input into the AI tool>*
   Output: *<insert the complete output from the second query>*

3. Github *CoPilot* (Feb 3, 2024 version)
   Query1: *<insert the exact wording you input into the AI tool>*
   Output: *<insert the complete output from the AI tool>*

4. Google *Bard* (Feb 2, 2024 version)
   Query: *<insert the exact wording of your query>*
   Output: *<insert the complete output from the AI tool>*

团队指南

团队必须：

1. 在报告中明确指出人工智能工具的使用LLMs或其他工具，包括：
   使用了模型以及用于什么目的。请使用内联引文和参考文献部分。此外，在 25 页的解决方案后附加 AI 使用报告（如下所述）。

2. 验证内容的准确性、有效性和适当性以及语言模型生成的任何引用，并纠正任何错误或不一致之处。

3. 按照此处提供的指导提供引文和参考文献。仔细检查引文，确保它们准确无误并被正确引用。

4. 请注意抄袭的可能性，因为LLMs可能会复制大量文本
   来自其他来源。检查原始来源以确保您没有剽窃他人的作品。

当我们发现可能使用此类工具未公开使用此类工具准备的提交内容时，COMAP将采取适当的行动。

引文和参考文献说明

仔细考虑如何记录和引用团队可能选择使用的任何工具。各种风格指南开始纳入引用和引用人工智能工具的政策。使用内联引文，并列出 25 页解决方案的参考部分中使用的所有 AI 工具。

无论团队是否选择使用 AI 工具，主要解决方案报告仍限制在 25 页以内。如果团队选择使用 AI，请在报告末尾添加标题为"AI 使用报告"的新部分。此新部分没有页数限制，不会计为 25 页解决方案的一部分。

示例（这并非详尽无遗 – 请根据您的情况调整这些示例）：

人工智能使用报告

1. OpenAI ChatGPT（2023年11月5日版，ChatGPT-4）
   Query1：⟨插入您在 AI 工具中输入的确切措辞⟩输出：⟨插入
   AI 工具的完整输出⟩

2. OpenAI Ernie（2023 年 11 月 5 日版，Ernie 4.0）
   Query1：⟨将任何后续输入的确切措辞插入 AI 工具⟩输出：⟨插入第二个查询
   的完整输出⟩

3. Github CoPilot（2024 年 2 月 3 日版）
   Query1：⟨插入您在 AI 工具中输入的确切措辞⟩输出：⟨插入
   AI 工具的完整输出⟩

4. Google Bard（2024年2月2日版）
   查询：⟨插入查询的确切措辞⟩输出：⟨插入 AI 工具的
   完整输出⟩