

Operation Eye-Spy

The Search and Rescue Visualization Project

or

Where to put the Rebel Base?

In mountainous environments, your field of view is often obstructed by large objects. This can be problematic if you are conducting a search and rescue operation, or helpful if you are hoping to conceal the Rebel Base.

The Project:

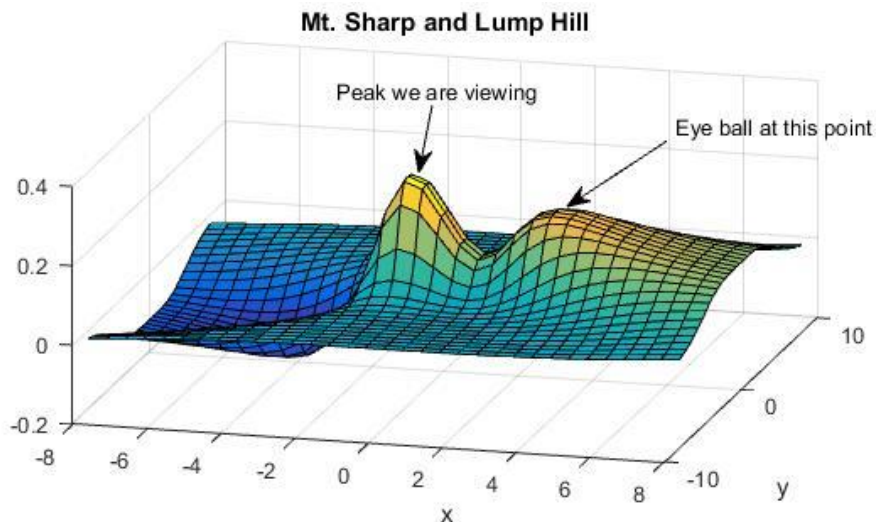
You are part of a team of three strategists who must devise a model to determine what can be seen from a fixed observation point. For the function

$$f(x, y) = \frac{x^3 - 3x + 4}{x^4 + 5y^4 + 20}$$

the observation point is precisely on the surface, at the point $(2.8, 0.5, f(2.8, 0.5))$, on Lump Hill. You look in the direction of the taller peak, Mt. Sharp.

The Basics:

- Determine the point on Mt. Sharp which you can see which is nearest to you.
- Describe as best you can the points that are hidden from view for someone at the observation point.
- Determine the amount of surface area on the mountain which you can see from the observation point and the amount which is hidden.



Beyond the Basics:

Expand your investigation beyond the basics above. You may choose the direction of your investigation. Options include, but are not limited to: Looking for alternate observation points, considering other mountainous functions, generalizing your strategy/algorithm, etc.

Project Requirements

For this project, you will be required to report your results in two ways:

1. Formal written brief report: Write a formal brief technical report discussing your model and strategies for the Operation Eye-Spy task. Since it is possible that other groups may have significantly different conclusions and expansions to the task, it is important that you justify your mathematics (and not just show your final answers.) The formal report must have

1. Cover page (including title, date, submitted by, prepared for, etc.)
2. Executive summary (1/2 page maximum, on its own page)
3. Two page report including introduction, body, and formal conclusion. Figures are included in this page limit. If you go beyond the 2 page limit, we will stop reading.

2. Class Poster Presentations: There will be two rounds of poster presentations. During the week of November 14th, your group will present a poster highlighting your current mathematical strategies for addressing the three Basic questions as well as your work Beyond the Basics. You will prepare a 5 to 7 minute spiel (persuasive presentation) to accompany your poster. This talk will be aimed at an audience of your peers, so you may assume that they are familiar with most of the background for the project and they are interested in your mathematical approach.

The second class poster presentation will provide you with an opportunity to present your final product. Where the first poster presentation can be seen as a reasonable draft of the project, this final poster presentation, coupled with your formal written brief report, is your opportunity to show a final polished version of your work. Your final poster should reflect this more polished and complete state. During the final poster presentation, we may have additional guests viewing the poster, so be prepared to accompany your poster with a presentation aimed at either an expert in the topic or a newcomer.