

VAST Challenge 2017 Reviewer Guide: Grand Challenge

This document provides information to support peer review of submissions to VAST Challenge 2017, Grand Challenge. This document covers background about the submission structure, the challenge problem, tasks and questions presented to participants, potential answers, and evidence found in the Challenge data supporting these answers. For a full description of the challenge problems and to access the data provided to the participants, please visit <http://vacomunity.org/VAST+Challenge+2017>.

Submissions

Participants are required to submit their entries on a standard answer form, along with a video explaining how visual analytics were used to help solve the challenges. Please consider both parts of the submission in your review. If you have difficulty reading the answer form or playing the video, please contact us at vast-challenge@ieee.org for assistance.

Scenario

Overview

Mistford is a mid-size city located to the southwest of a large nature preserve. The city has a small industrial area with four light-manufacturing endeavors. Mitch Vogel is a post-doc student studying ornithology at Mistford College and has been discovering signs that the number of nesting pairs of the Rose-Crested Blue Pipit, a popular local bird due to its attractive plumage and pleasant songs, is decreasing! The decrease is sufficiently significant that the Pangera Ornithology Conservation Society is sponsoring Mitch to undertake additional studies to identify the possible reasons. Mitch is gaining access to several datasets that may help him in his work, and he has asked you (and your colleagues) as experts in visual analytics to help him analyze these datasets.

Mitch realizes that explorations into each of these three areas (covered by the mini-challenges) will reveal important, enlightening information. However, could there be relationships among discoveries made across two or even all of the investigations that could reveal even more about what is happening across the nature preserve and how it is happening. Mitch remembers that you mentioned to him how important it is to analyze not only what is happening, but the entire range of “who-what-where-why-when- and –how”. This understanding will enable him to pursue positive steps in helping to save the Rose-Crested Blue Pipit.

Ground Truth

Information from each of the mini-challenges contributes to the understanding of the ground truth. The location of a strange truck stop in mini-challenge 1 is one key piece of evidence. If the transportation map is superimposed on the imagery showing the growing anomaly in mini-challenge 3, this provides

evidence that the truck is dumping some substance that is impacting the environment. The air emissions analysis from mini-challenge 2 should place a high degree of suspicion on the Kasios company. The most important piece of information to investigate is whether Kasios's trucks are doing the dumping of processing waste in the Preserve.

Data

The only extra data provided for the Grand Challenge are issues of the Mistford Industrial Park newsletter. There are some interesting data tidbits in the newsletter including Financial Updates for the companies. Kasios's bottom line seems to take an upswing during the same period where illegal use of the cheaper but more harmful Methylosmolene occurs.

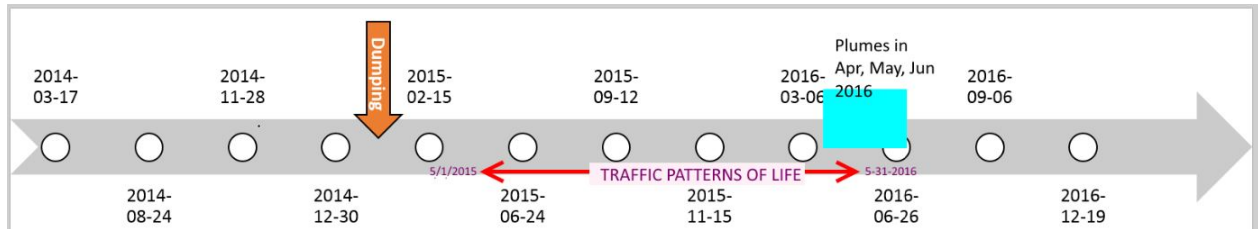
P.S. Our Easter Egg in the Grand Challenge data is the image and story about John Torch in the December 2015 edition. "John Torch" was the mayor of Alderwood in our 2006 VAST Challenge, who was blackmailed during a local election. Yes, the picture is of the same character actor as in 2006. Definitely some sort of recognition is warranted if anyone identifies him.

Challenge Questions (See the combined solution below)

- 1. Provide your best hypothesis with supporting evidence of what is happening in the Lekagul Preserve that is affecting the Rose-crested Blue Pipit. Your answer should include identification of who is responsible for the impactful activities, what they are doing, where impactful events are occurring, when and how often these occur, how these events are taking place, and why they are happening.*
- 2. Provide a timeline that comprehensively describes the relevant activities in Mistford, the Industrial Park, and the Preserve that helps concisely describe the events identified in Question 1.*
- 3. How confident are you in your hypothesis? What factors impact your confidence in your hypothesis? What additional information would help strengthen your hypothesis?*
- 4. What are your proposed next steps? Do you have a course of action to correct the problems in the Lekagul Preserve and help the Rose-crested Blue Pipit?*

Solution

Timeline



What is killing the Rose-Crested Blue Pipit?

Methylosmolene, a trade name for a family of volatile organic solvents. After the publication of several studies documenting the toxic side effects of Methylosmolene in vertebrates, the chemical was strictly regulated in Mistford. Liquid forms of Methylosmolene are required by law to be chemically neutralized before disposal. AGOC-3A was promoted as a more environmentally friendly alternative chemical compound.

Who is killing the Rose-Crested Blue Pipit?

Kasios Office Furniture. They are illegally dumping barrels of Methylosmolene containing sludge in the forest during the day and are venting the volatile chemical at night.

More about "the Actors":

Roadrunner Fitness Electronics produces personal fitness trackers, heart rate monitors, headlamps, GPS watches, and other sport-related consumer electronics. Roadrunner used Methylosmolene as a solvent to clean flux and other contaminants from electronic components prior to the application of weather-proofing compounds. They used more Methylosmolene than Indigo Sol, but less than Radiance or Kasios. When the regulations on the use of Methylosmolene were passed, Roadrunner adapted their procedures to use AGOC-3A in their solvent bath. Roadrunner cares about the environment because their customers expect them to.

Kasios Office Furniture manufactures metal and composite wood office furniture including desks, tables, and chairs. Kasios used Methylosmolene to clean their spray paint booths and spray paint guns. When the chemical was regulated, Kasios switched to AGOC-3A but later discovered that it was less effective, resulting in an unacceptable rise in labor and material costs, which threatened the company's profit margins. Accordingly, Kasios decided to return to using Methylosmolene, but without adopting the new guidelines for handling due to their added costs. To hide their tracks, they are dumping the sludge containing paint and Methylosmolene in the nature preserve, where it is getting into the soil and the water. Additionally, Kasios is venting their shop directly to the atmosphere, which releases Methylosmolene in unacceptable amounts. The paint booths and guns are cleaned during the evening shift and the barreled sludge is dumped when it can be done inconspicuously.

Radiance ColourTek produces solvent-based optically variable metallic flake paints. Radiance used Methylosmolene as a solvent to clean paint production equipment. Radiance used more Methylosmolene than the other three companies did. When the regulations on Methylosmolene were passed, Radiance kept using the compound but adapted their processes to meet the new requirement. Unlike Kasios, Radiance are good citizens and bird fans. They are also polite.

Indigo Sol Boards produces skateboards and snowboards. Indigo Sol used Methylosmolene as a solvent to clean their resin impregnation equipment. They used less Methylosmolene than the other three companies did. When the regulations on the use of Methylosmolene were passed, Indigo Sol adapted their procedures to use AGOC-3A for all their resin removal needs. Indigo Sol cares about the environment.

The information from mini-challenge 1 identifies the dumping operation in the Preserve by a truck in a restricted area. The information from mini-challenge 2 indicates Kasios as venting Methylosmolene. The information from mini-challenge 3 shows the sludge impact on the environment, and shows the location being at the dumping spot.

The Industrial Park writeup show how Kasios is improving their financial status lately, which corresponds to their return to using Methylosmolene.

Reviewer Considerations

GC Questions and Approach:

- Did the team use all of the mini-challenge data to synthesize a solution? Did it appear to be a comprehensive answer to the wildlife problem in the preserve?
- Did the team use the additional Grand Challenge information to derive their solution?
- Was the conclusion of the submitting team reasonable and logically derived? Did they express a confidence level in their answer?
- Did the submission propose reasonable next steps or one or more future courses of action?

Application of visual analytics:

- Did the team develop an innovative visual analytic tool? Alternatively, did they use an existing tool in an innovative way?
- Did visualizations enable the analysis process? Or did they merely illustrate conclusions? Did the submission rely more heavily on non-visual analytic approaches?
- Did their tool allow useful interactions?
- Did they use all the available data? Was the submission clear?