Challenge 1 Supplemental Information

In Challenge 1, you are tasked with creating a representation of the drug trafficking environment. To earn points in this competition, your representation must incorporate:

- Geographic factors (20 points): your representation should include at least two factors that capture the geography of the WHTZ. For example, you might choose to factor the navigability of different areas (e.g. land and certain water ways are unnavigable) as an element of your representation.
- Target characteristics (20 points): your representation should include at least two characteristics that dictate the behavior and detectability of drug runner targets. An example might be the range of a target or its top speed.
- Dynamic scenario elements (20 points): your representation should include at least two elements that are dynamic over time. For example, you might incorporate weather or sea state data to determine how likely drug runners are to go through a certain area of ocean.
- Creative insights (20 points): your representation should include at least two additional factors. Here, you will be judged based on your creativity, so try to think outside-the-box!
- Data requirements (20 points): as you build your representation, it is important to consider what data your representation will require. For example, your representation might incorporate intelligence and weather data. How would you use this data, and why do you think it is important?

As you go about creating your representation of the drug trafficking environment for this Challenge, keep in mind that you will use this representation for the remainder of the competition. As you create your representation, you will want to start thinking about how you will use it as an input to your model. In addition, you will want to start thinking about how you might demonstrate elements of your representation and overall approach.

To give you additional context and help you start thinking about how to create a representation with the above elements, we are providing you with the following supplemental information.

Drug Runner Target Specifications

Drug runners use a variety of platforms to smuggle cocaine, from “go-fast” Panga boats to traditional fishing vessels to custom made low-profile boats and semi-submersibles. In this competition, we are asking you to focus on detecting Panga boats, which make up the vast majority of illicit maritime traffic in the WHTZ.

Detecting Panga boats being used for drug smuggling is difficult for several reasons. To start, Panga boats come in a variety of shapes and sizes, each with differing capabilities. As a result, there is no single target profile to look for. Further, Panga boats are a common type of fishing vessel in the WHTZ, so illicit targets are mixed in with a large number of legitimate fishing vessels with similar profiles. Still, there are things that set drug running boats apart—their behavior differs from fishing behavior, heavy loads of cocaine mean that the boats sit lower in the water, etc.

From Mooshegian (2013), pg. 6-7: “The Caribbean has seen a significant increase in the number of go–fast boats used to transport illicit drugs. These vessels travel at high speeds, are small, display nearly no radar cross–section, and are hard to see during the day, all of which makes them difficult to find, track, and interdict. They can carry as much as two metric tons of cocaine and their transits usually last one or two days (Office of National Drug Control Policy, 2013). In the eastern Pacific, fishing vessels typically depart from Colombian and Ecuadorian ports carrying several tons of cocaine to ports in Central America or Mexico.”

Below, we have given you some links to begin researching Panga boats and get a better understanding of the drug runner target profile for your representation of the drug trafficking environment.

Panga Boat Wikipedia: https://en.wikipedia.org/wiki/Panga_(skiff)

Pintrest showing a variety of Panga boats: https://www.pinterest.com/kepis713/panga/

Panga boat manufacturer with specs: https://pangaboatsusa.com/specs-models/

Intelligence Reports

JIATFS receives intelligence reports on drug trafficking activities. These reports vary both in their availability and accuracy. Below are some examples illustrating the information contained in these intelligence reports for you to consider as you create your drug trafficking environment representation.

From Campos III (2014), pg. 11: “The intelligence input consists of waypoint locations, departure times, velocity, and drug loads. There are also uncertainties associated with the intelligence inputs. For example, the intelligence may point to a vessel leaving from a 100-kilometer (km) stretch of coast, controlled by a particular cartel, during a 72-hr period.”

From Campos III (2014), pg. 24:

Intelligence Data	Example Case Information Data
I. Departure Location	(lat,lon) = (11, -74.33)
II. Arrival Location	(lat,lon) =(15.25, -83.24)
III. Waypoint	(lat,lon) =(5,–77)
IV. Velocity	(max, min)=(10,20)
V. Value/Load	2500 kg/Cocaine
VI. Certainty	0.5
VII. Target Type	SPSS
VIII. Departure Time	(Earliest, Latest)=(10,25)

Table 1. Sample Data of the Case Information File.

Weather and Sea State

Weather and Sea state conditions impact drug trafficking operations in the WHTZ, as well as JIATF operations (which you will want to consider in Challenge 2). For example, drug traffickers may utilize fog to hide their movements, but avoid storms. See the following links for additional information.

Climate and Oceanography:

Caribbean Sea Information: https://en.wikipedia.org/wiki/Caribbean_Sea

Pacific Ocean Information: https://en.wikipedia.org/wiki/Pacific_Ocean

El Nino and La Nina information (relevant to Eastern Pacific): https://www.climate.gov/news-features/understanding-climate/el-ni%C3%B1o-and-la-ni%C3%B1a-frequently-asked-questions

Weather:

Weather Radar and Forecast: https://weather.com/

Storm Report for Eastern Pacific: https://www.accuweather.com/en/hurricane/east-pacific

NOAA Weather Imaging Data: https://www.star.nesdis.noaa.gov/goes/

Sea State:

Information on sea state: https://en.wikipedia.org/wiki/Sea_state

Automatic Identification System

Automatic Identification System (AIS) data could be useful for filtering out possible targets from non-targets. Panga boats like those used by drug traffickers will almost never transmit AIS data, regardless of illicit activity. Therefore, vessels transmitting AIS data are unlikely to be targets for this challenge. You might also think of additional creative ways to utilize AIS data in your drug trafficking environment representation. For more information on AIS and AIS requirements, see the following links.

AIS Wikipedia: https://en.wikipedia.org/wiki/Automatic_identification_system

AIS regulations from the international maritime organization (IMO): https://www.imo.org/en/OurWork/Safety/Pages/AIS.aspx

Historical AIS data: https://www.vesselfinder.com/historical-ais-data

Adaptive Behavior

The model you produce for this competition should work on a timescale of about one month. Over this time period, there are likely to be micro and macro level changes in the behavior of drug runners in response to JIATFS operations. As you create your representation of the drug trafficking environment, you may want to consider how you might reflect these changes in your representation. For an introduction to these adaptive dynamics, see the following references:

llain, Richard J. An evolving asymmetric game for modeling interdictor-smuggler problems. NAVAL POSTGRADUATE SCHOOL MONTEREY CA, United States, 2016

Magliocca, Nicholas R., et al. "Modeling cocaine traffickers and counterdrug interdiction forces as a complex adaptive system." Proceedings of the National Academy of Sciences 116.16 (2019): 7784-7792.