Probabilistic Hazard Information Processing System (PHIPS): Rapid Generation and Blending of Probabilistic Forecasts for Severe Convective Hazards

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Overview

Efforts are underway to transition away from the dichotomous NWS watch/warning system for severe convective hazards toward a system allowing forecasters to communicate forecast uncertainty (FACETs). However, executing the generation of such forecasts under the time constraints inherent to the warning decision making process is a challenge. This poster outlines a proposed process methodology for the rapid generation of probabilistic forecasts.

This methodology employs the concept of objects, thus leveraging the following versatile capabilities:

- Identifying geospatial features of importance.
- Bundling information as a series of organized, easily-modifiable attributes
- Compact file size for fast transportability
- Serialization/deserialization into/out of many formats for use with various applications and programming languages.

The flow charts on the right depict an implementation of the proposed methodology which supports experiments in the Hazardous Weather Testbed (HWT). The system utilizes multi-core processing to generate automated object-based probabilistic forecasts for up to ~100 objects in less than the update frequency of ~2 minutes. These forecasts are shipped to the HWT for display/interrogation by forecasters, who can modify automated object attributes (e.g., motion, probability, longevity) or manually create their own objects. The forecaster's workstation blends the automated, manual, and modified probabilistic forecasts onto a common grid for export into common gridded formats (e.g., NetCDF, grib2, png)

For 2015, the system used a 6° latitude x 8° longitude floatable domain over the U.S. For 2016, the system will run over the CONUS, along with utilizing LDM for improved transportability internally and across NOAA for development purposes.

Probabilistic Forecast Generation

Must be executed < 2 minutes

Object-based Guidance
- ProbSevere
- Azimuthal Shear

LDM →

Data Processing Server
- 6° Lat x 8° Lon floatable domain (2015)
  - 2016 – full CONUS
- Generate automated probabilistic forecasts
  - Objects (geojson)
  - Grids (npz)
- Ship within network (2015)
  - 2016 – drop into LDM

HWT Workstation
- Blends automated, manual, and modified probabilistic forecasts from multiple forecasters
  - Process manual forecasts (background)
  - Process modified forecasts (background)
  - Blend automated forecasts
  - Blend manual/modified forecasts
  - Output NetCDF, grib2, and png

Hazardous Weather Testbed

AWIPS-II

Prototype PHI Tool

Enhanced Data Display (EDD) for PHI

Converting Forecast Objects into Probabilistic Forecast Grids…

PHI Object (geojson)

Object-relative gridding →

Euclidean Distance Transform

Merge to common geospatial grid

Apply Gaussian Filter

NetCDF

grib2

png