Weather Alerts Data with R

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Weather Alerts Data

- The National Weather Service (NWS) syndicates information on current weather alerts at http://alerts.weather.gov/cap/us.php?x=1
- No existing R package retrieves this current weather alert information
- Alert information is not too useful by itself…

Alert Areas

- The NWS defines the geographic areas under weather alerts using UGC codes: http://www.nws.noaa.gov/emwin/winugc.htm
- Corresponding geographic polygons are defined in four different shapefiles that are large (118 MB), poorly documented, and difficult to work with: http://www.nws.noaa.gov/geodata/ (states, counties, zones, fire zones)
- In addition, many alert areas are defined via ad-hoc polygons: http://www.srh.noaa.gov/images/bmx/aware/swaw_2010/web_version_pages_p6.pd
- Need to have the area polygons merged with the alerts information to do any mapping or spatial analysis of weather alerts

Solution

- Two R packages:
  - **weatherAlerts**: get weather alerts
  - **weatherAlertAreas**: define alert areas (22 MB)
- Both on GitHub
  - https://github.com/ianmcook/weatherAlerts
  - https://github.com/ianmcook/weatherAlertAreas

```
devtools::install_github("ianmcook/weatherAlerts")
devtools::install_github("ianmcook/weatherAlertAreas")
```

Usage

```
library(weatherAlerts)
?getAlerts
```

- 50 states and DC

```
alerts <- getAlerts()
```

- 48 states and DC

```
alerts <- getAlerts(excludeStates = c("AK", "HI"))
```

- Specific state(s)

```
alerts <- getAlerts(includeStates = "FL")
```

Output

- If package **weatherAlertAreas** is installed, returns a **SpatialPolygonsDataFrame** with the alert information and the alert area polygons
- Otherwise returns a data frame containing the alert information

Processing Output

- Assign colors to alert severity levels

```
severity <- factor(alerts@data$severity)
severityLevels <- levels(severity)
severityLevels[severityLevels == "Minor"] <- "green"
severityLevels[severityLevels == "Moderate"] <- "yellow"
severityLevels[severityLevels == "Severe"] <- "red"
severityLevels[severityLevels == "Extreme"] <- "magenta"
severityLevels[severityLevels == "Unknown"] <- "white"
levels(severity) <- severityLevels
severityColors <- as.character(severity)
```

Mapping the Results

- Using **maps** package

```
library(maps)
alertsMap <- SpatialPolygons2map(alerts)
map("county", "ca")
map(alertsMap, add=TRUE, fill=TRUE, col=severityColors)
```

- Using **leaflet** package

```
library(leaflet)
leaflet() %>%
  addTiles() %>%
  addPolygons(data = alerts, color="black", fillColor=severityColors, weight=1)
```

Finding Weather Alerts for a Specific Location

```
mylocation <- SpatialPoints(
  matrix(c(-122.4167, 37.7833), ncol = 2),
  proj4string = CRS("+proj=longlat +datum=WGS84")
)
localAlerts <- over(mylocation, alerts, returnList = TRUE)[[1]]
```

- Please don't depend on this to save you from a tornado!

What's Next

- Improve performance (currently really slow)
- Do things the Hadley Wickham way (httr, rvest, underscores instead of camelCase!)
- Submit to CRAN
- Find international collaborators
- Keep up to date with NWS alert area changes and API changes
- Track new developments in R's handling of spatial data (https://github.com/edzer/sfr)