

A close-up of a hand holding a waffle cone with three scoops of ice cream (vanilla, chocolate, and vanilla) against a blurred background of a beach and ocean. The hand has dark blue nail polish.

# "Learning GIS with ice-cream parlors"

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# About me

- Sociology MA Graduate, BGU
- Been using R Programming language for < 2 years
- Had no idea what is GIS prior to using R
- Enjoy:
  - Open source tools (R, Linux, Git, MySQL)
  - Blogging
  - Learning new things
  - 🎲 & 🍷

# "Regular" data

How I first encountered and learn to work with data:

```
head(iris)
```

##	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
## 1	5.1	3.5	1.4	0.2	setosa
## 2	4.9	3.0	1.4	0.2	setosa
## 3	4.7	3.2	1.3	0.2	setosa
## 4	4.6	3.1	1.5	0.2	setosa
## 5	5.0	3.6	1.4	0.2	setosa
## 6	5.4	3.9	1.7	0.4	setosa

# Spatial data\*

How I encountered spatial data (e.g. [.shp](#)):

```
head(shelters[,2])
```

```
## Simple feature collection with 6 features and 0 fields
## Geometry type: POINT
## Dimension:      XY
## Bounding box:   xmin: 181680.1 ymin: 574027.4 xmax: 181972.9 ymax: 574304
## Projected CRS: Israel 1993 / Israeli TM Grid
## # A tibble: 6 x 1
##               geometry
##               <POINT [m]>
## 1 (181710.6 574217.8)
## 2 (181680.1 574304)
## 3 (181820.6 574243)
## 4 (181819.3 574027.4)
## 5 (181972.9 574046.2)
## 6 (181912.3 574151.1)
```

\* To reflect my learning process, I address spatial data here as in a vector format (and not, e.g., raster)

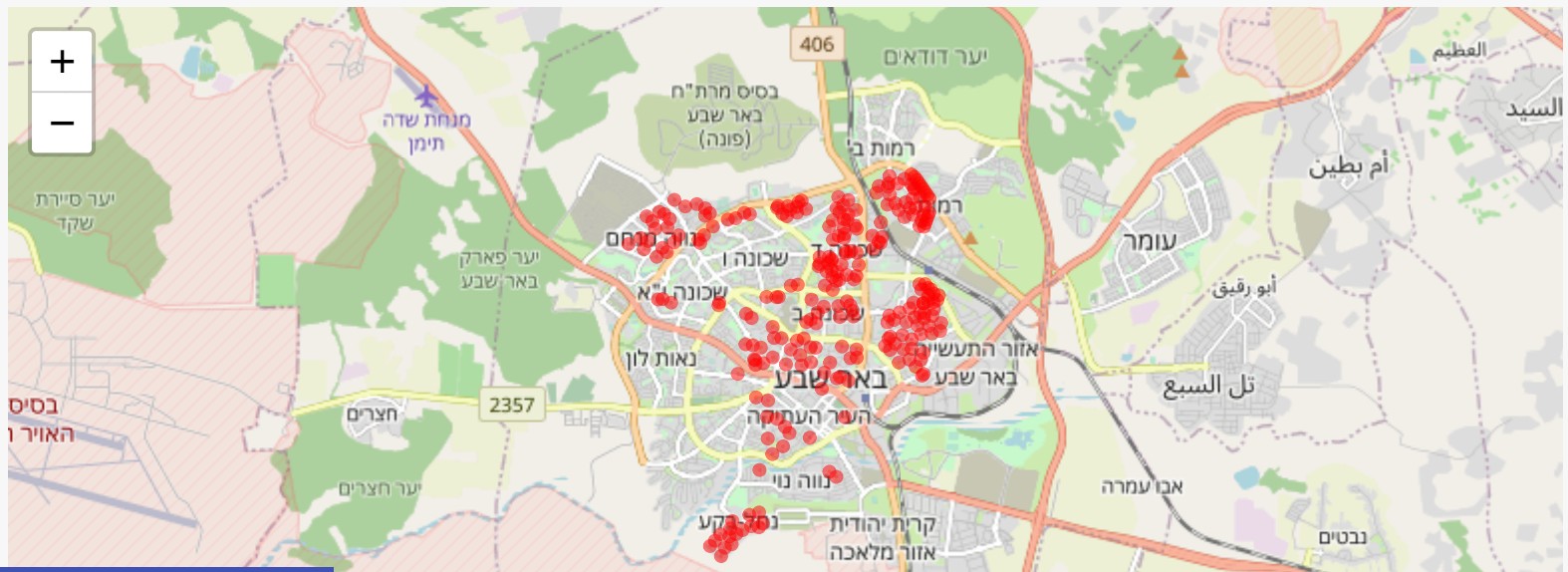


# Returning to my comfort zone

Used a `.csv` file instead:

```
## # A tibble: 6 x 2
```

```
##   lat lon
##   <dbl> <dbl>
## 1  31.3  34.8
## 2  31.3  34.8
## 3  31.3  34.8
## 4  31.3  34.8
## 5  31.3  34.8
## 6  31.3  34.8
```



Exploring distances to the  
nearest ice-cream parlors

# Background

- Fiddled around but never really knew what I was doing
- Participated in several days of the [#30Daysmapchallenge](#)
- Realized it's time to learn some spatial analysis

## Inspiration

Dominic Royé's blog post about [distances to the sea in Iceland](#)

## Serendipitous resource

Michael Dorman's [Spatial data analysis workshop](#) at Israel's CBS



# Data

Where do you find ice-cream locations data?

The screenshot shows the website goldaglida.co.il, which lists ice cream stores in Hebrew. The page has a dark blue background with yellow text. The stores are arranged in a grid. A developer tool overlay is visible on the right side of the page, showing the DOM tree and the selected element's properties. The selected element is a button with the text "אור יהודה" (Or Yehuda). The developer tool shows the following HTML structure:

```
<div class="page_title fade_in" data-font-size="16" data-font-size-type="px" data-line-height="24px">...</div>
<div id="main-content" class="main-content" data-font-size="16" data-font-size-type="px" data-line-height="24px">
  <div id="primary" class="content-area" data-font-size="16" data-font-size-type="px" data-line-height="24px">
    <div id="content" class="site-content" role="main" data-font-size="16" data-font-size-type="px" data-line-height="24px">...</div>
    <div class="stores" data-font-size="16" data-font-size-type="px" data-line-height="24px">
      <div class="content" data-font-size="16" data-font-size-type="px" data-line-height="24px">
        <div class="store_address" data-font-size="16" data-font-size-type="px" data-line-height="24px">
          <a class="mapto" href="javascript:void(0);" rel="bookmark" data-address="אור יהודה, אריק איינשטיין 1" role="button" aria-controls="map-canvas" title="לחצו למיקום" data-font-size="20" data-font-size-type="px" data-line-height="20px">== $0
            <span class="store_name" data-font-size="20" data-font-size-type="px" data-line-height="20px">אור יהודה
            <div class="double_line" data-font-size="20" data-font-size-type="px" data-line-height="20px"></div>
          <small>...</small>
        </a>
      </div>
    </div>
  </div>
</div>
```

The developer tool also shows the selected element's properties:

- Color: #C0B88B
- Font: 20px Alef
- ACCESSIBILITY: Name 03-7797577 1 יחודה כשר אריק איינשטיין, Role button, Keyboard-focusable

# Data collection

- Scrape the data from the website

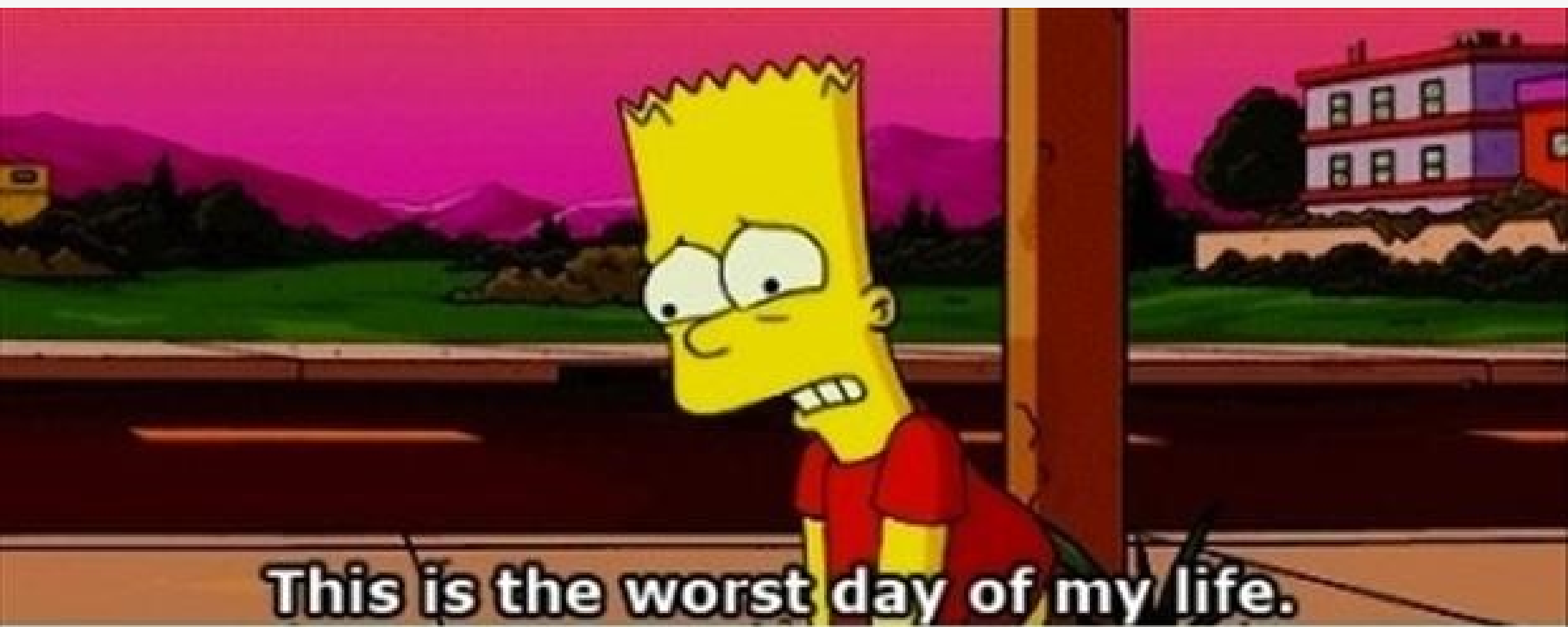
```
## [1] "\" עקיבאח\אור\ח\כשרח\ח8\ח\השקמים\ח04-646-0705\ח\ח\""
```

- Clean it
- Geocode the data to get lat & long from addresses
- Reverse geocode the long & lat and verify each address.

Final output looked like this (total of 79 addresses):

city	street	number	location	lon	lat	google_address
אור עקיבא	השקמים 8	04-646- 0705	השקמים 8, אור עקיבא	34.91794	32.50436	Ha-Shikmim St 8, Or Akiva, Israel

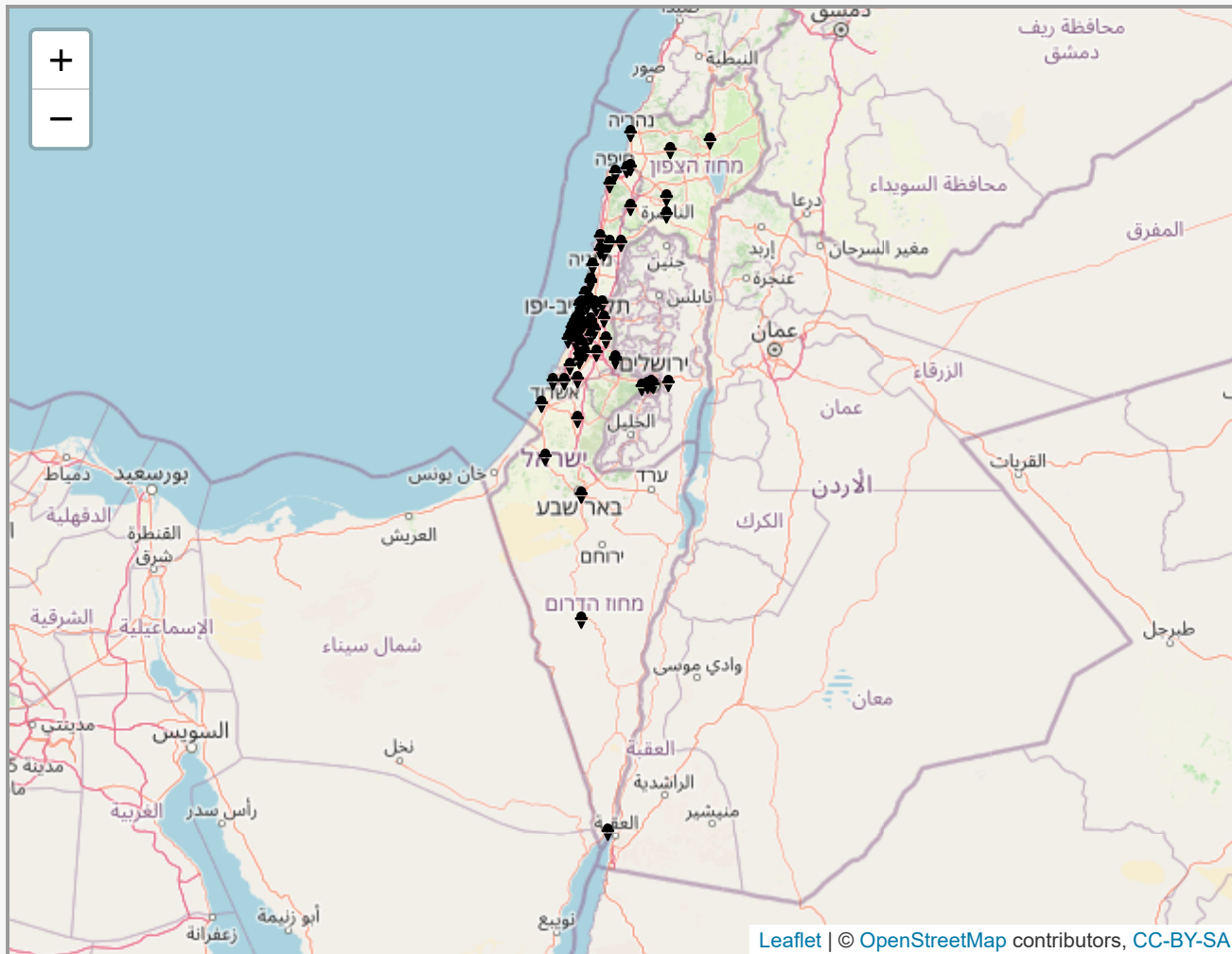
Discrepancies were manually verified (though I probably verified everything anyway).



**This is the worst day of my life.**



# How does our data look?



If you can't see the iframe, please refresh the page.

# Some spatial manipulations

# Transforming

We might want to be more explicit with our spatial data:

## Geographic

```
## Simple feature collection with 1 feature and 0 fields
## Geometry type: POINT
## Dimension:      XY
## Bounding box:   xmin: 34.86002 ymin: 32.02051 xmax: 34.86002 ymax: 32.02051
## Geodetic CRS:   WGS 84
## # A tibble: 1 x 1
##           geometry
##           <POINT [°]>
## 1 (34.86002 32.02051)
```

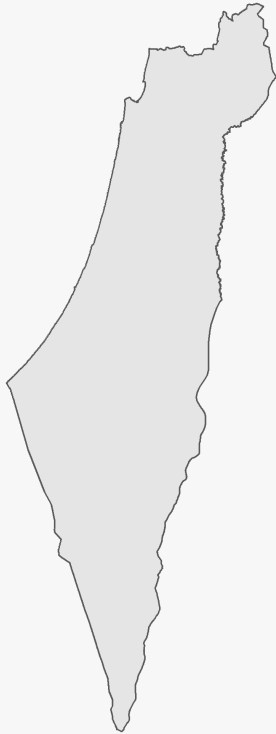
## Projected

```
## Simple feature collection with 1 feature and 0 fields
## Geometry type: POINT
## Dimension:      XY
## Bounding box:   xmin: 186911.1 ymin: 658636.9 xmax: 186911.1 ymax: 658636.9
## Projected CRS:  Israel 1993 / Israeli TM Grid
## # A tibble: 1 x 1
##           geometry
##           <POINT [m]>
```

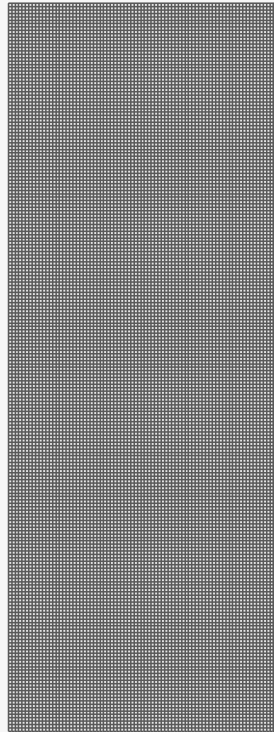
# Grids

We want to calculate distances to Golda, but **from where?**

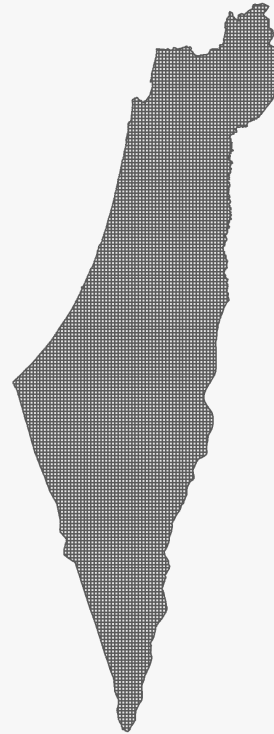
**Original map**



**Grid layout (2km<sup>2</sup>)**



**Israel as grid**





# Distances

We have our grid cells, how do we identify the **nearest ice-cream location?**

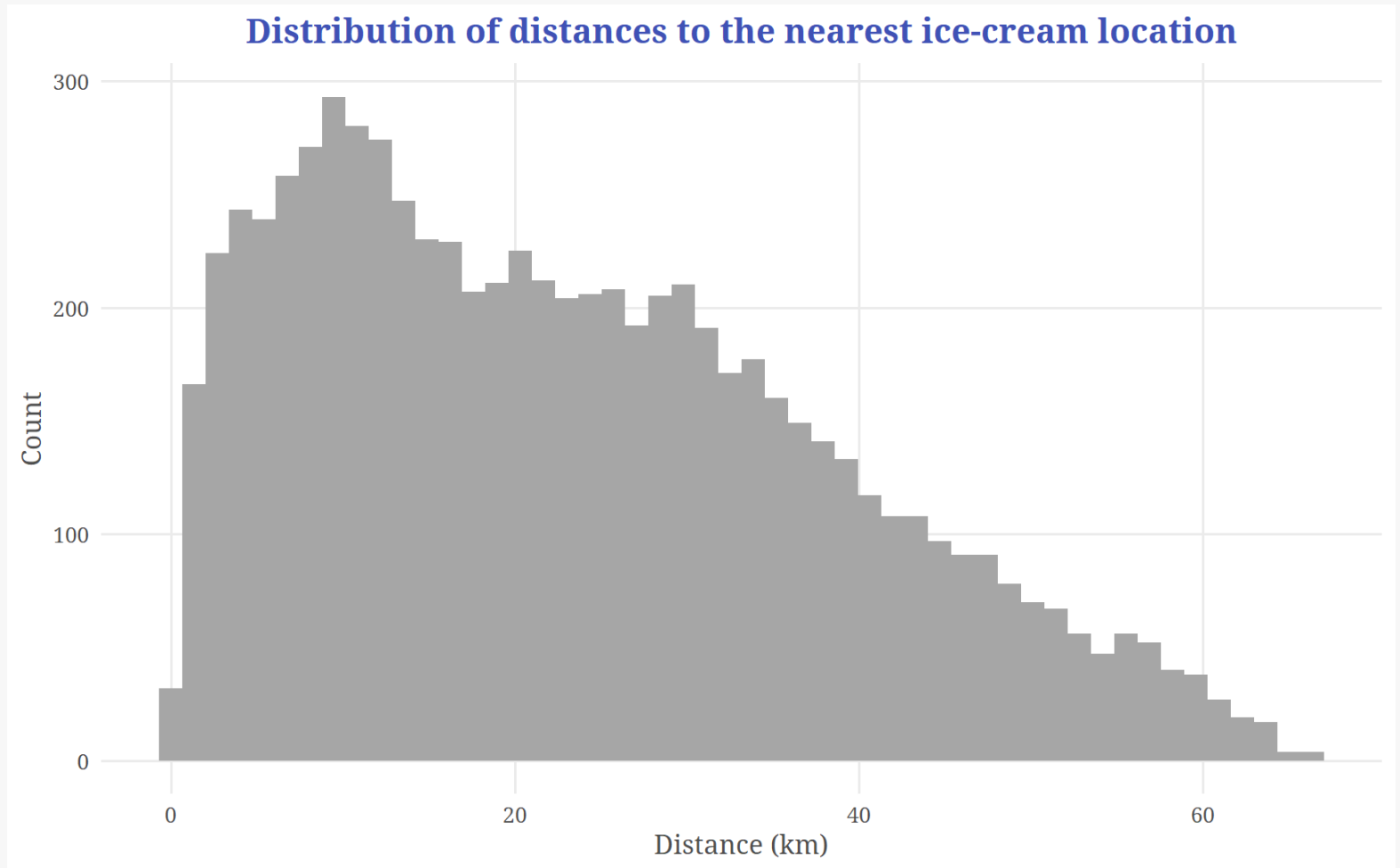
Example for 1 grid cell to several Goldas:

```
example_distances <- st_distance(  
  # Print 10:  
  head(set_units(example_distances,
```

```
## Units: [km]  
##           [,1]  
## [1,] 218.88346  
## [2,] 272.69260  
## [3,]  57.20938  
## [4,] 194.03313  
## [5,] 182.41663  
## [6,] 209.48198  
## [7,] 131.61719  
## [8,] 256.71129  
## [9,] 218.63946  
## [10,] 225.91495
```



# Distances



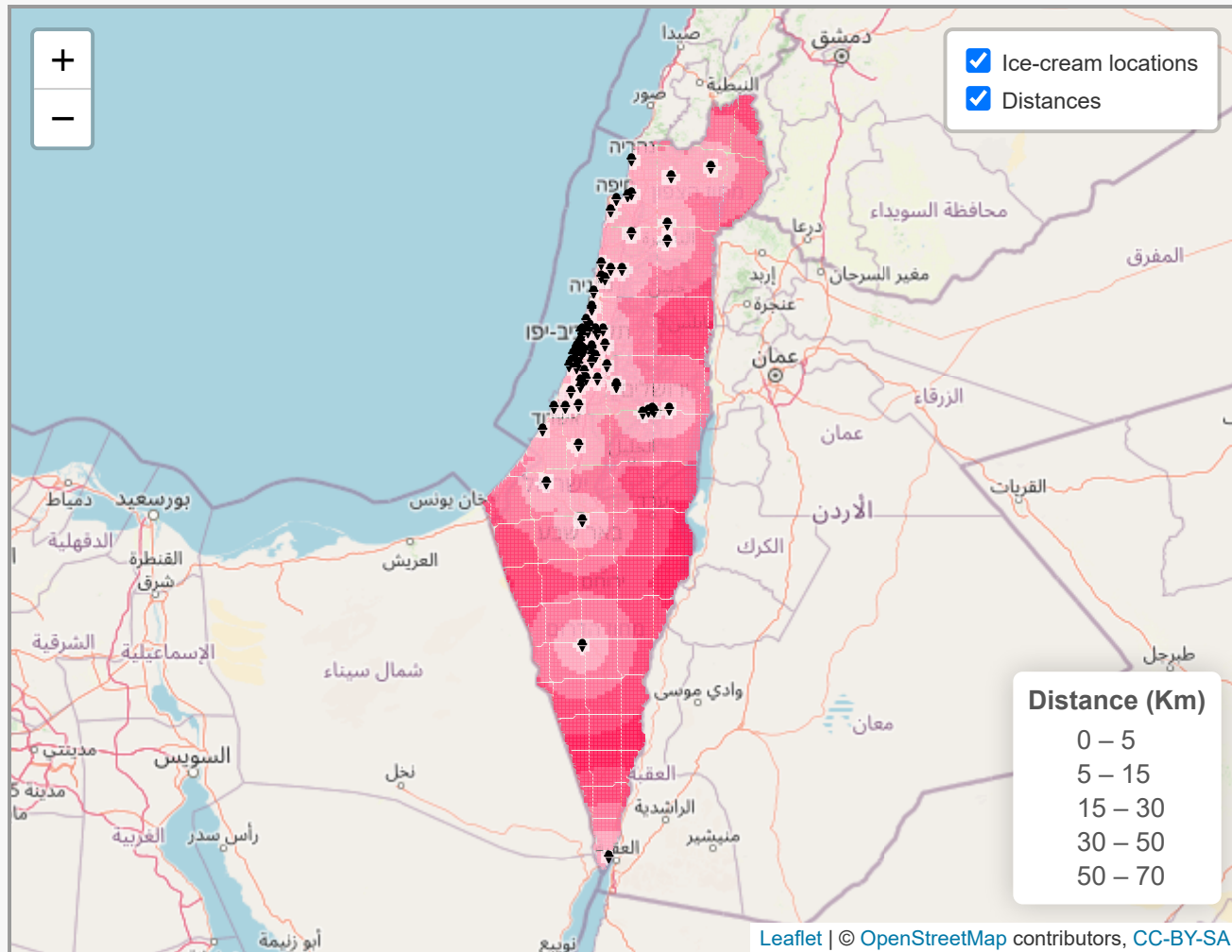
# Cosmetics ✨✂️

```
## Rows: 7,375
## Columns: 7
## $ geometry.x <POLYGON [°]> POLYGON ((34.90188 29.49693..., POLYGON ((34.91
## $ distance_km <dbl> 7.871391, 7.332709, 6.613721, 7.363470, 6.918497, 5.722
## $ location_id <dbl> 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3
## $ city <chr> "א" , "אילת" , "אילת" , "אילת" , "אילת" , "אילת" , "אילת" , "אילת~
## $ street <chr> "מתחם הספירל" , "מתחם הספירל" , "מתחם הספירל" , "מתחם הספירל"~
## $ number <chr> "08-9428989", "08-9428989", "08-9428989", "08-9428989",
## $ geometry.y <POINT [°]> POINT (34.95968 29.54952), POINT (34.95968 29.549
```

```
create_label_distances <- function(km, street, city){
  glue("
    <div style='text-align:left;'>
    You are <span style='font-size:13px;'><b>{round(km, 1)}</b></span> km
    <div style='text-align:right;'>
      {street}, {city}</div>") %>%
  HTML()}
```

```
## [[1]]
## <div style='text-align:left;'>
## You are <span style='font-size:13px;'><b>7.9</b></span> km from the nearest
## <div style='text-align:right;'>
## אילת , מתחם הספירל</div>
```

# Et Voila



If you can't see the iframe, please refresh the page.

How does this relate to open  
source

# Feedback

🗨️ Don't I have anything better to blog about?

| Someone will always have what to say about your work

## Positive

👍 Someone asking for technical assistance about using the code in another country.

👍 Micha Silver emailing me with complete code on how to do the same thing with rasters.

# Personal reasons

- GIS was available in an already used OS platform (R)
- Free
- Can use/change others' code freely
- Pushes to high standards knowing others see/read your code
- Get to contribute back
- **The community!**

Thank you!

