CHAPTER 1

Geocoding and Reverse Geocoding

Geocoding and reverse geocoding are essential processes in geographic information systems (GIS) that are used to convert between addresses and spatial data.

1.1 Geocoding

Geocoding is the process of converting addresses (like ”1600 Amphitheatre Parkway, Mountain View, CA”) into geographic coordinates (like latitude 37.423021 and longitude -122.083739), which you can use to place markers on a map, or position the map. The resulting latitude and longitude are often used as a key index in merging datasets based on location.

Here is an example of using Google’s Geocoding service to get the longitude and latitude of the Dallas County Administration Building:

```
import requests
```

```
import json

# Encode the parameters
parameters = {"address": "411 Elm St, Dallas, TX 75202"  , "key": "YOUR_API_KEY"}
base_url = "https://maps.googleapis.com/maps/api/geocode/json?"

# Send the GET request
response = requests.get(base_url,  params=parameters)

# Convert the response to json
data = response.json()

# Extract the latitude and longitude
if len(data["results"]) > 0:
    latitude = data["results"][0]["geometry"]["location"]["lat"]
    longitude = data["results"][0]["geometry"]["location"]["lng"]
else:
    print(f"Could not find the latitude and longitude.")
```

1.2 Reverse Geocoding

Reverse geocoding, as the name implies, is the opposite process of geocoding. It involves converting geographic coordinates into a human-readable address. This can be useful in applications where you need to display an actual address to a user instead of latitude and longitude coordinates.

Here is an example of using Google's reverse geocoding API to find the address for

```
import requests
import json

api_key = "YOUR_API_KEY"
latitude = 33.9474096
longitude = -118.1179069

 # Encode the parameters
parameters = {"latlng": f"{latitude},{longitude}", "key": api_key}
base_url = "https://maps.googleapis.com/maps/api/geocode/json?"

# Send the GET request
response = requests.get(base_url, params=parameters)

# Convert the response to json
data = response.json()
```

```
# Extract the address
if len(data["results"]) > 0:
    address = data["results"][0]["formatted_address"]
else:
    print(f"Could not find the address")
```

Appendix A

Answers to Exercises

Index