

# Geocoding

We want to convert between addresses and lat/lon, for map-making purposes. We'll use Google's API for this: <https://developers.google.com/maps/documentation/geocoding/start>

Copy their example URL, and retrieve it with requests module:

```
import requests
url = "https://maps.googleapis.com/maps/api/geocode/json?
address=1600+Amphitheatre+Parkway,+Mountain+View,
+CA&key=YOUR_API_KEY"
r = requests.get(url)
r.json()
```

Note that we need to have an access key, and pay (if we use the API very heavily):

```
{'error_message': 'The provided API key is invalid.',
 'results': [],
 'status': 'REQUEST_DENIED'}
```

Go to "Get API Key" and follow directions to create credentials and copy your key. Use it in your request:

```
KEY = "aixjx;qjx1358135"
ADDR = "1600+Amphitheatre+Parkway,+Mountain+View,+CA"
url = "https://maps.googleapis.com/maps/api/geocode/json?"
URL += "address=" + ADDR + "&key=" + KEY
r = requests.get(url)
r.json()["results"][0]["geometry"]["location"]
```

It's good practice to keep your key in some file:

```
with open("google.key") as f:
    KEY = f.read().strip()
```

Make a function to build a GeoDataFrame from the lat/lon:

```
def get_geo_df(addr=[]):
    rows = []
    for addr in addr:
        url = "https://..." + addr.replace(" ", "+") + "&key=" + KEY
        r = requests.get(url)
        loc = r.json()["results"][0]["geometry"]["location"]
        rows.append({"loc": Point(loc["lng"], loc["lat"]), "addr": addr})
    df = geopandas.GeoDataFrame(rows, geometry="loc")
    return df
df = get_geo_df(["1210 W. Dayton, Madison, WI", "Capital, Madison, WI"])
```

Remember to cache results to make it faster and stay in the "free tier".