Fetch Google Reviews for POIs (Aveiro)

Goal: Build a pipeline to fetch reviews for Points of Interest (POIs) in Aveiro, using:

- **OSM-derived POIs** (from `pois_aveiro.csv`)
- **Google Places API (v1)** for place search and place details (reviews)
- Output to `reviews_output.csv` for downstream **NLP** (sentiment & topic modeling)

> **Note:** Google Places **reviews** are limited to 5 reviews per POI

1. Setup & Requirements

Requirements

1. A **Google Cloud Project** with **Places API** enabled.
2. A valid **API key**
3. The input file `pois_aveiro.csv` including `geom_pt` (EWKB, SRID=4326) and/or `geom` .

Environment variables:

- `GOOGLE_API_KEY` : API key.

In [ ]:
```
import requests
import time
import os
import pandas as pd
from shapely import wkb

GOOGLE_API_KEY = os.getenv("GOOGLE_API_KEY", "AIzaSawdawyAwme_k4xStLv2_bL
INPUT_CSV = "../pois_aveiro.csv"
SLEEP_BETWEEN_REQUESTS = 0.25  # seconds to avoid hitting rate limits
RADIUS_METERS = 10  # Search within a 10-meter radius by default
MAX_PLACES_PER_RUN = 20  # Limit the number of places to query
```

2. Helper Functions

Utilities for geometry parsing and API calls.

In [2]:
```
def ewkb_hex_point_to_lonlat(hex_str: str):
    """
    Convert EWKB hex POINT (SRID=4326) to (lon, lat).
    Many exports store POINT as EWKB hex like '0101000020E6100000...'
    """
    if not isinstance(hex_str, str) or not hex_str:
        return None
    try:
        geom = wkb.loads(bytes.fromhex(hex_str))
        if geom.geom_type == "Point":
            return (geom.x, geom.y)
    except Exception:
        pass
    return None


# Helper Functions for Places API

def places_search_nearby(lat, lon, radius=500, types=["restaurant"]):
    """
    Use Google Places Nearby Search to search for places within a given r
    Returns the places found and the API call status.
    """
    url = "https://places.googleapis.com/v1/places:searchNearby"
    payload = {
        "locationRestriction": {
            "circle": {
                "center": {
                    "latitude": lat,
                    "longitude": lon
                },
                "radius": radius
            }
        },
        # "includedTypes": types,
        "maxResultCount":  (MAX_PLACES_PER_RUN or 10),
    }
    params = { 'key': GOOGLE_API_KEY }
    headers = {
        "X-Goog-FieldMask": "places.displayName,places.id,places.reviews,
        "X-Goog-Api-Key": GOOGLE_API_KEY,
        "Content-Type": "application/json",
    }

    try:
        # Send POST request to the Nearby Search API
        response = requests.post(url, params=params, json=payload, header
        time.sleep(SLEEP_BETWEEN_REQUESTS)
        response.raise_for_status()
    except requests.exceptions.RequestException as e:
        print(f"Error during API request: {e}")
        return None, "ERROR"

    data = response.json()
    places = data.get("places", [])
    return places, "OK" if places else "ZERO_RESULTS"

def process_reviews(reviews):
    """
    Extract the reviews from the response and format them into a list of
    """
    reviews_data = []
    for review in reviews:
        reviews_data.append({
            "author_name": review.get("authorAttribution", {}).get("displ
            "rating": review.get("rating"),
            "review_text": review.get("text", {}).get("text", ""),
            "publish_time": review.get("publishTime"),
        })
    return reviews_data

def get_reviews_for_nearby_places(lat, lon, radius=500):
    """
    Fetch nearby places and their reviews within the specified radius.
    Returns a list of reviews and the status of the operation.
    """
    places, status = places_search_nearby(lat, lon, radius)
    if not places:
        return [], f"No nearby places found. Status: {status}"

    all_reviews = []
    for place in places:
        place_id = place.get("id")
        place_name = place.get("displayName", {}).get("text", "")
        place_location = place.get("location", {})
        place_rating = place.get("rating")
        place_primary_type = place.get("primaryType", "Unknown")
        reviews = place.get("reviews", [])
        processed_reviews = process_reviews(reviews)

        for review in processed_reviews:
            review["place_name"] = place_name
            review["place_id"] = place_id
            review["place_location"] = place_location
            review["place_rating"] = place_rating
            review["place_primary_type"] = place_primary_type
            all_reviews.append(review)

    return all_reviews, "OK"
```

3. Load & Preview POIs

We expect `pois_aveiro.csv` to contain, among many attributes, at least:

- `gid` : unique id
- `amenity` / `shop` / `tourism` : category hints
- `geom_pt` (preferred) or `geom` : EWKB encoded `POINT` (SRID 4326)

In [3]:
```
pd.set_option("display.max_columns", 60)
try:
    df = pd.read_csv(INPUT_CSV, low_memory=False)
    display(df.head(3))
    print(f"Loaded {len(df)} rows from {INPUT_CSV}")
except FileNotFoundError:
    print(f"WARNING: {INPUT_CSV} not found. Place it next to this noteboo
    df = pd.DataFrame()
```

	gid	access	addr:city	addr:country	addr:hamlet	addr:housename	addr:housenumbe
0	1	NaN	NaN	NaN	NaN	NaN	Na
1	2	NaN	NaN	NaN	NaN	NaN	Na
2	3	NaN	Aveiro	NaN	NaN	NaN	Na

3 rows × 530 columns

```
Loaded 13258 rows from ../pois_aveiro.csv
```

4. Processing Logic per-POI

For each row:

1. Determine **amenity** (or fallbacks).
2. Parse **coordinates** from `geom_pt` / `geom` .
3. Build a **name hint** from available name columns.
4. **Nearby Search** to fetch place name, place ID, place location, place rating, place type and **reviews** (limited to `MAX_REVIEWS_PER_PLACE`).

In [4]:
```
def run_pipeline():
    # Load POIs from file
    df = pd.read_csv(INPUT_CSV)

    out_rows = []
    processed = 0

    # Loop over each POI and process reviews
    for idx, row in df.iterrows():
        if processed >= MAX_PLACES_PER_RUN:
            break

        # Get coordinates from 'geom_pt' or 'geom' column
        lonlat = None
        if "geom_pt" in df.columns and isinstance(row.get("geom_pt"), str
            lonlat = ewkb_hex_point_to_lonlat(row.get("geom_pt"))
            print(lonlat)
        if lonlat is None and "geom" in df.columns and isinstance(row.get
            lonlat = ewkb_hex_point_to_lonlat(row.get("geom"))

        if not lonlat:
            continue

        lon, lat = lonlat

        # Fetch reviews for the nearby places
        reviews_data, status = get_reviews_for_nearby_places(lat, lon, RA

        if reviews_data:
            # Add reviews data to output rows
            for review in reviews_data:
                out_rows.append(review)

        processed += 1

    # Create DataFrame and save to CSV
    if out_rows:
        df_reviews = pd.DataFrame(out_rows)
        df_reviews.to_csv("nearby_reviews.csv", index=False)
        print(f"Saved reviews data to 'nearby_reviews.csv'.")
    else:
        print("No reviews fetched.")

    return df_reviews
```

```
df_reviews = run_pipeline()
display(df_reviews.head(10))
```

```
/tmp/ipykernel_106354/3264769247.py:3: DtypeWarning: Columns
(3,4,5,6,7,8,9,11,12,13,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,3
2,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,5
7,59,60,61,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,8
3,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,10
5,106,107,108,109,111,112,113,114,115,116,117,118,119,120,121,122,123,12
4,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,142,14
3,144,145,146,147,149,150,151,152,153,154,155,156,157,158,159,160,161,16
2,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,18
0,181,182,183,186,187,188,189,190,191,192,193,194,196,197,198,199,200,20
1,202,203,204,205,206,207,208,209,211,212,213,214,215,217,220,222,223,22
4,225,226,227,228,229,230,232,236,237,240,241,242,243,244,245,246,248,24
9,250,251,252,253,254,256,257,258,259,261,262,263,264,265,266,267,268,26
9,270,271,272,273,274,275,276,278,279,280,282,283,284,286,287,288,289,29
0,291,292,293,294,295,296,298,299,300,301,302,303,304,305,306,307,308,30
9,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,32
7,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,34
5,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,36
3,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,38
1,382,383,384,385,386,387,388,389,390,392,398,399,401,402,403,404,405,40
7,408,411,412,413,415,416,417,418,419,420,421,423,424,425,426,427,428,42
9,430,431,432,433,434,435,436,437,438,439,440,442,443,444,445,446,449,45
2,455,459,463,465,466,467,468,469,470,471,472,473,474,475,476,477,479,48
0,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,49
8,499,500,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,51
7,518,520,521,523,524,525,526) have mixed types. Specify dtype option on i
mport or set low_memory=False.
  df = pd.read_csv(INPUT_CSV)
(-8.7288263, 40.6338208)
(-8.558722, 40.7202822)
(-8.6412275, 40.6318767)
(-8.6303399, 40.6483621)
(-8.6529905, 40.6408293)
(-8.6155501, 40.6530001)
(-8.6302907, 40.6481634)
(-8.6289941, 40.6490393)
(-8.6305762, 40.6464895)
(-8.6398177, 40.6372592)
(-8.6186598, 40.6448436)
(-8.6232773, 40.6425727)
(-8.6553328, 40.6424277)
(-8.643414, 40.6219823)
(-8.6424403, 40.6202283)
(-8.6397822, 40.6160724)
(-8.6556364, 40.6407427)
(-8.6544847, 40.6414747)
(-8.540525, 40.5609636)
(-8.529471, 40.5664656)
Saved reviews data to 'nearby_reviews.csv'.
```

	author_name	rating	review_text	publish_time	place_name	
0	Markus Wenger	4		2024-11-08T10:05:22.566412Z	Avelab - Esgueira	(
1	Lara Mendes	5	Muito simpáticos! A entrega foi rapidíssima e ...	2025-10-28T20:47:06.519725824Z	EATIN	Chl
2	Diogo Moço	5	Encomendei comida para casa e foram rápidos na...	2025-10-28T20:47:48.904490884Z	EATIN	Chl
3	Nicole	5	saboroso, ótima entrega e muito simpáticos	2025-10-24T03:35:24.556694520Z	EATIN	Chl
4	José Cândido	5	O Mercado Gastronômico e Cultural de Aveiro, t...	2025-08-29T13:11:40.256631901Z	Mercado Gstronomico e Cultural	Cl
5	Guilherme Gomes	5		2025-07-31T14:13:32.213237010Z	Capela de Aradas A	
6	Christian Efraim Haziel	5	I simply loved it. Best value for money I foun...	2025-07-13T15:31:19.697171341Z	Garden Hostel	
7	Félix Cloutier	1	It's a forty minutes walk away (3km) from Avei...	2023-05-21T18:55:05.704969Z	Garden Hostel	
8	Diego andres Camargo	2	I give him two stars for the backyard and the ...	2021-08-12T23:21:10.035467Z	Garden Hostel	
9	Adarsha আদর্শ シ	4	Fairly ok for overnight stay, in low price!! ...	2023-08-19T01:33:20.314940Z	Garden Hostel	

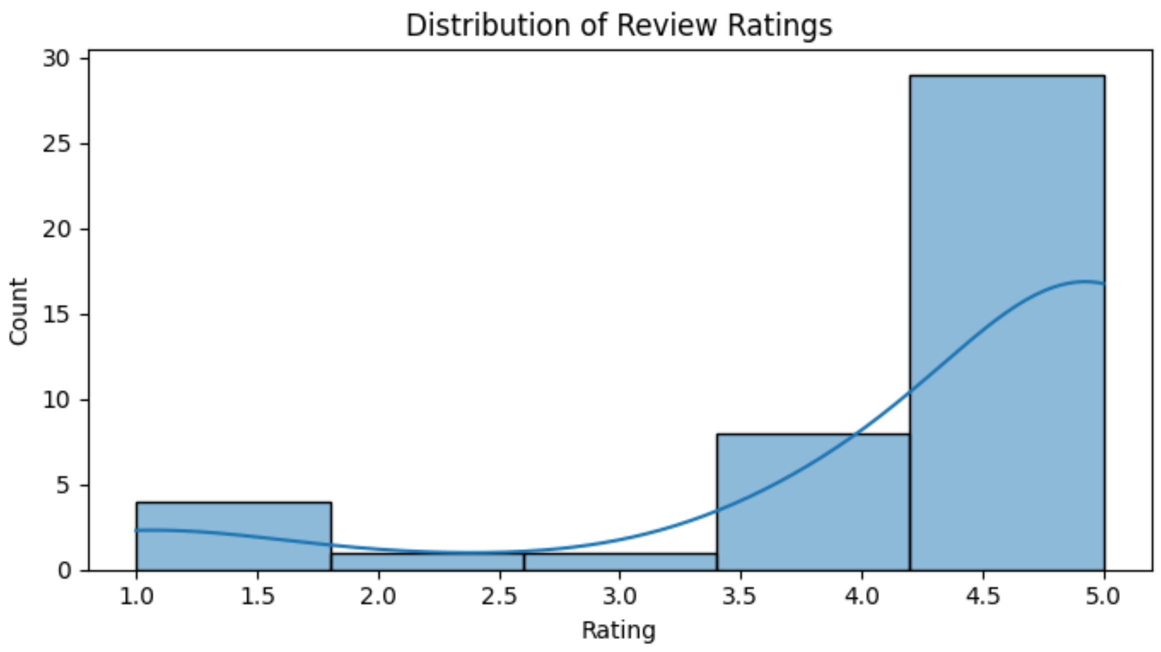
5. Graphical Analysis of the Output

In [5]:
```python
import pandas as pd
import ast

# adjust path as needed
csv_path = "nearby_reviews.csv"
df = pd.read_csv(csv_path)

# parse datetimes
```

```
df['publish_time'] = pd.to_datetime(df['publish_time'], errors='coerce')

# numeric ratings
df['rating'] = pd.to_numeric(df['rating'], errors='coerce')
df['place_rating'] = pd.to_numeric(df['place_rating'], errors='coerce')

# parse place_location string like "{'latitude': 40.63, 'longitude': -8.6
def parse_loc(s):
    try:
        return ast.literal_eval(s)
    except Exception:
        return {}
df['place_location'] = df['place_location'].fillna('').apply(parse_loc)
df['lat'] = df['place_location'].apply(lambda x: x.get('latitude'))
df['lon'] = df['place_location'].apply(lambda x: x.get('longitude'))

# convenience
df['review_length'] = df['review_text'].fillna('').str.len()
df['year_month'] = df['publish_time'].dt.to_period('M')
```

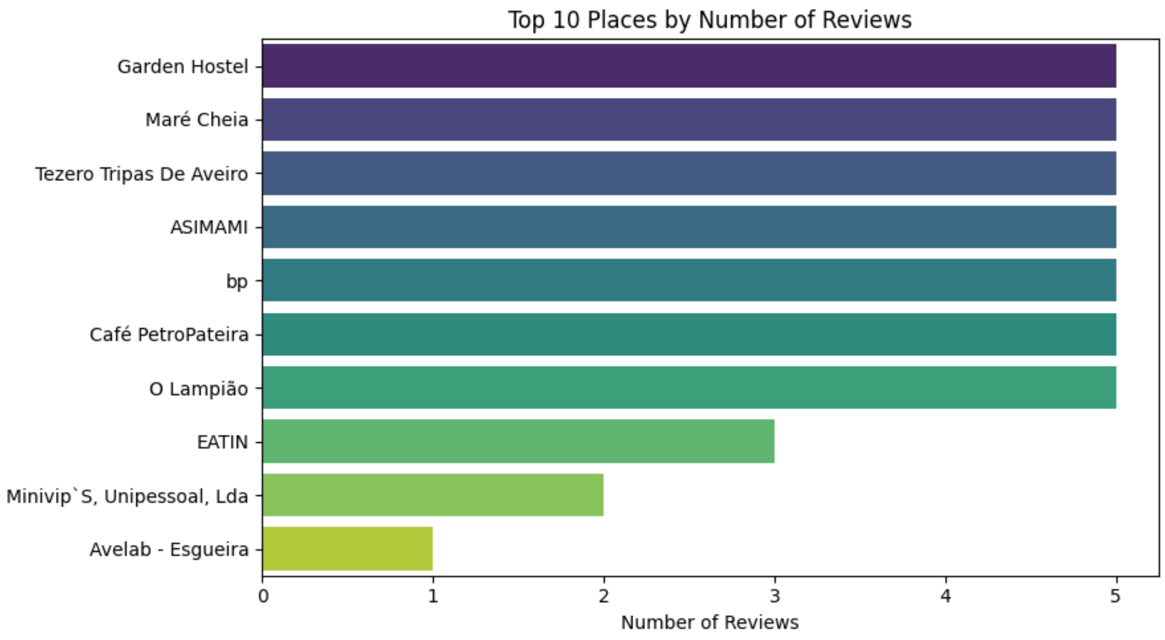
```
/tmp/ipykernel_106354/2978812369.py:27: UserWarning: Converting to PeriodA
rray/Index representation will drop timezone information.
  df['year_month'] = df['publish_time'].dt.to_period('M')
```

In [6]:
```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(7,4))
sns.histplot(df['rating'].dropna(), bins=5, kde=True)
plt.title("Distribution of Review Ratings")
plt.xlabel("Rating")
plt.ylabel("Count")
plt.tight_layout()
plt.show()
```



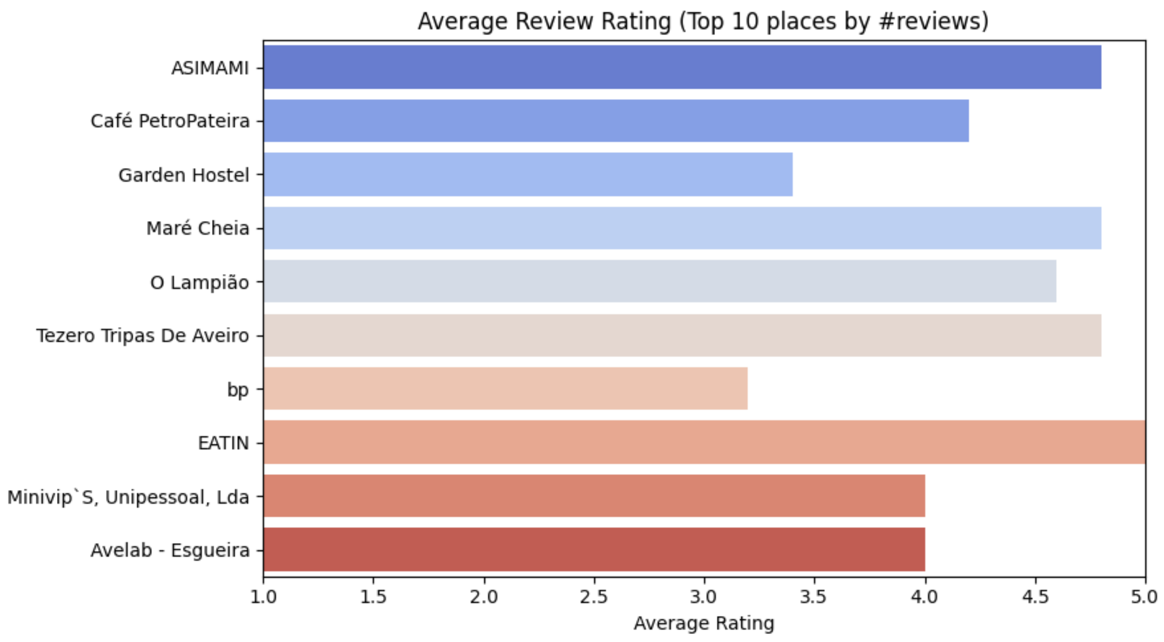
In [7]:
```
top_places = df['place_name'].value_counts().nlargest(10).reset_index()
top_places.columns = ['place_name','n_reviews']

plt.figure(figsize=(9,5))
sns.barplot(data=top_places, y='place_name', x='n_reviews', palette='viri
plt.title("Top 10 Places by Number of Reviews")
plt.xlabel("Number of Reviews")
plt.ylabel("")
plt.tight_layout()
plt.show()
```

```
/tmp/ipykernel_106354/3900431756.py:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be remove
d in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for
the same effect.

  sns.barplot(data=top_places, y='place_name', x='n_reviews', palette='vir
idis')
```

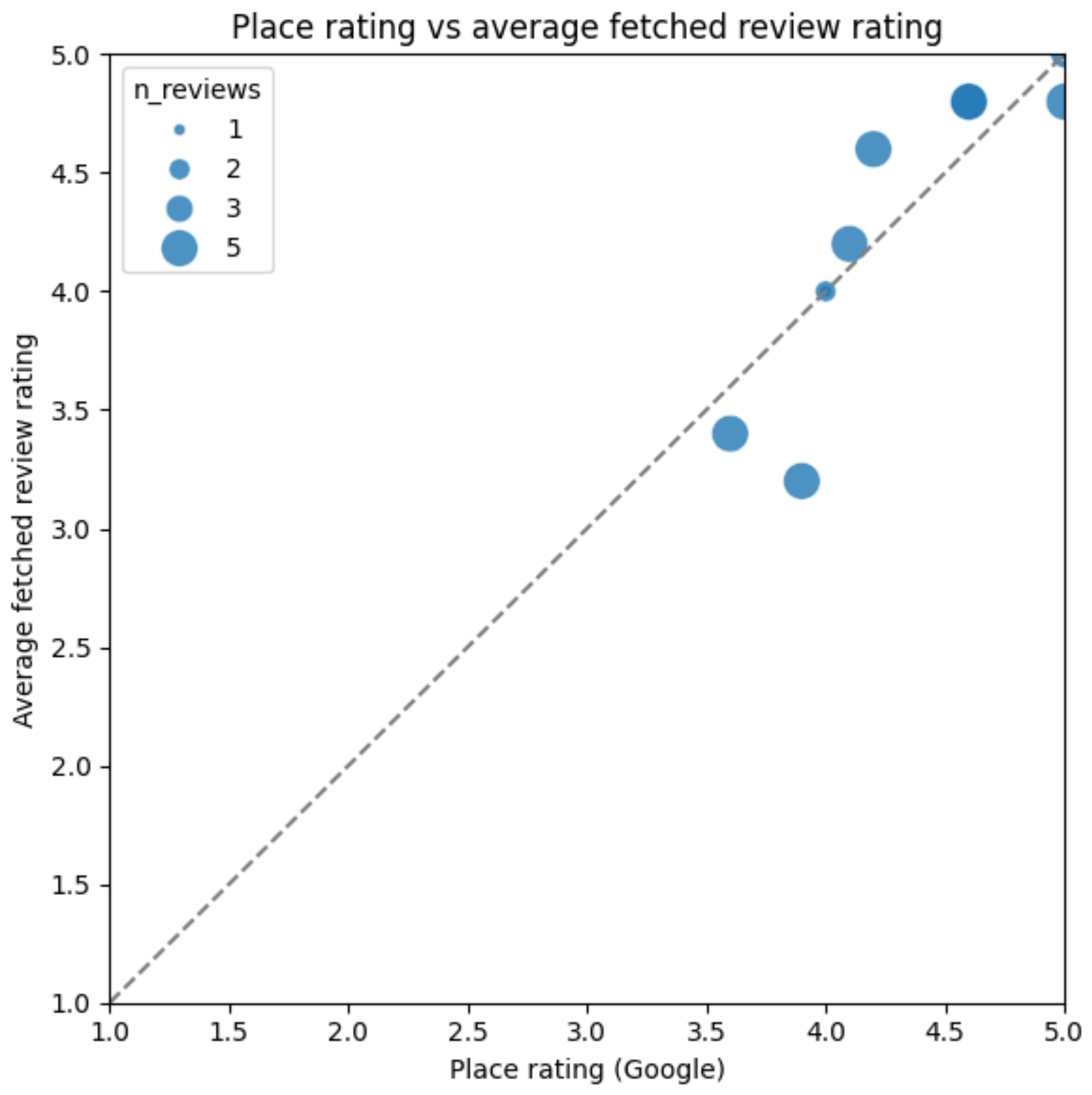


In [8]:
```
agg = df.groupby('place_name').agg(n_reviews=('rating','count'), mean_rat
agg_top = agg.sort_values('n_reviews', ascending=False).head(10)

plt.figure(figsize=(9,5))
sns.barplot(data=agg_top, y='place_name', x='mean_rating', palette='coolw
plt.xlim(1,5)
plt.title("Average Review Rating (Top 10 places by #reviews)")
plt.xlabel("Average Rating")
plt.ylabel("")
plt.tight_layout()
plt.show()
```

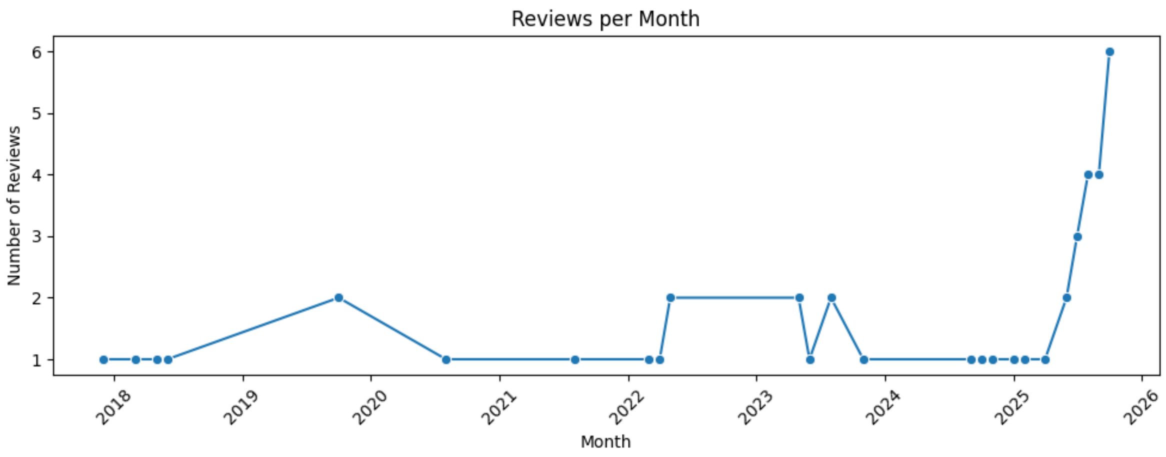
```
/tmp/ipykernel_106354/2439568483.py:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be remove
d in v0.14.0. Assign the `y` variable to `hue` and set `legend=False` for
the same effect.

  sns.barplot(data=agg_top, y='place_name', x='mean_rating', palette='cool
warm')
```



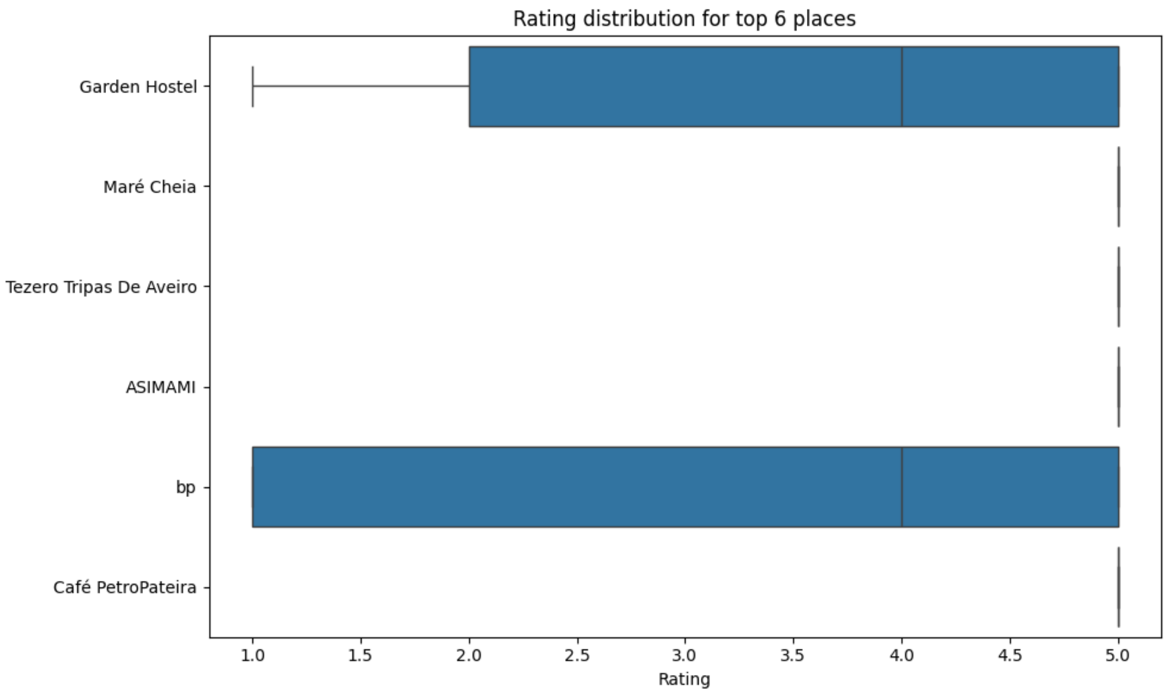
In [9]:
```
place_stats = df.groupby('place_id').agg(place_name=('place_name','first'
                                         avg_review_rating=('rating','mea
                                         place_rating=('place_rating','fi
                                         n_reviews=('rating','count')).re
plt.figure(figsize=(6,6))
sns.scatterplot(data=place_stats, x='place_rating', y='avg_review_rating'
plt.plot([1,5],[1,5], color='gray', linestyle='--')  # identity
plt.xlabel("Place rating (Google)")
plt.ylabel("Average fetched review rating")
plt.title("Place rating vs average fetched review rating")
plt.xlim(1,5); plt.ylim(1,5)
plt.tight_layout()
plt.show()
```



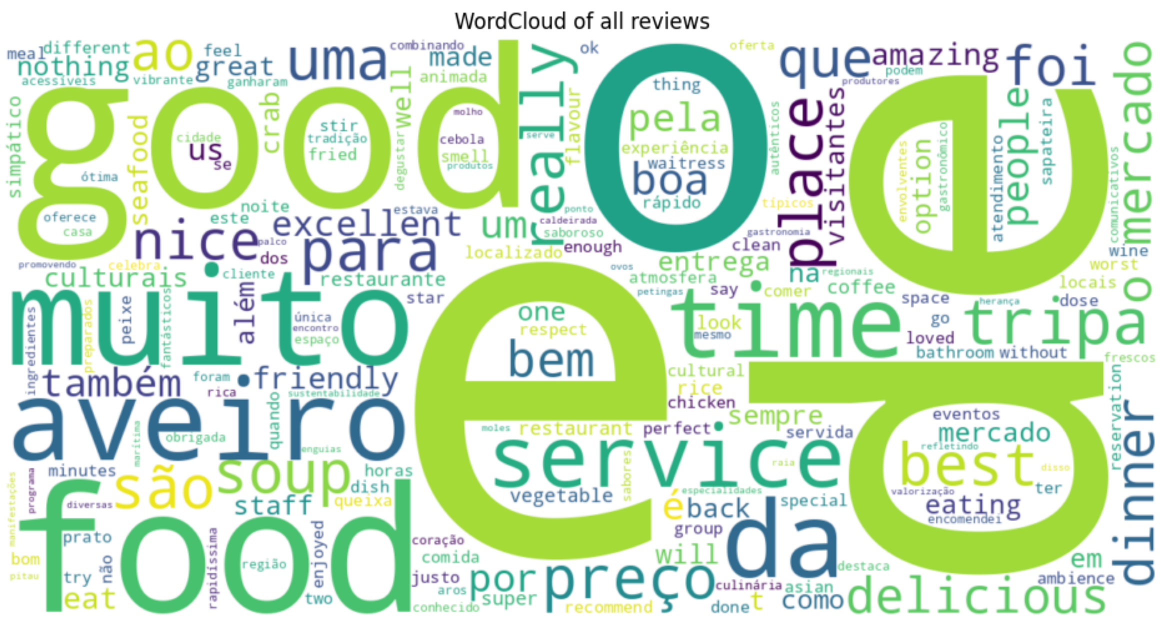
In [10]:
```
ts = df.groupby('year_month').size().reset_index(name='n_reviews')
ts['year_month'] = ts['year_month'].dt.to_timestamp()

plt.figure(figsize=(10,4))
sns.lineplot(data=ts, x='year_month', y='n_reviews', marker='o')
plt.title("Reviews per Month")
plt.xlabel("Month")
plt.ylabel("Number of Reviews")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



In [11]:
```
top6 = df['place_name'].value_counts().nlargest(6).index.tolist()
plt.figure(figsize=(10,6))
sns.boxplot(data=df[df['place_name'].isin(top6)], x='rating', y='place_na
plt.title("Rating distribution for top 6 places")
plt.xlabel("Rating")
plt.ylabel("")
plt.tight_layout()
plt.show()
```



In [12]:
```
from wordcloud import WordCloud
import matplotlib.pyplot as plt
import re

def clean_text(s):
    s = re.sub(r'\\W+', ' ', str(s).lower())
    return s

text = " ".join(df['review_text'].dropna().map(clean_text).tolist())
wc = WordCloud(width=1200, height=600, background_color='white', max_word

plt.figure(figsize=(12,6))
plt.imshow(wc, interpolation='bilinear')
plt.axis('off')
plt.title("WordCloud of all reviews")
plt.show()
```


WordCloud of all reviews
e
o
good
food
muito
aveiro
time
service
da
preço
tripa
dinner
delicious
best
mercado
place
really
uma
para
que
foi
nice
ao
bem
soup
são
pela
boa
também
por
excellent
friendly
seafood
culturais
great
nothing
amazing
people
option
visitantes
entrega
staff
eating
back
mercado
sempre
restaurant
restaurante
coffee
one
look
rice
chicken
cultural
vegetable
special
will
eat
como
em
atmosfera
localizado
experiência
waitress
rápido
clean
enough
made
well
animada
crab
us
se
além
noite
este
dos
different
meal
feel
acessíveis
vibrante
ganharam
simpático
ótima
oferece
casa
peixe
ingredientes
minutes
prato
bom
try
não
rapidíssima
enjoyed
justo
comida
coração
super
recommend
done
asian
culinária
ambience
destaca
atendimento
sapateira
reservation
eventos
space
loved
bathroom
without
wine
locais
worst
dose
go
frescos
ter
encomendei
perfect
servida
horas
dish
queixa
stir
fried
tradição
cebola
smell
flavour
thing
ok
oferta
combinando
produtores
podem
autênticos
gastronômico
envolventes
comunicativos
star
respect
say
comer
mesmo
na
obrigada
quando
foram
rica
única
espaço
two
aros
conhecido
região
group
minutes