Estimating the Number of Traditional Coffee Shops (Warung Kopi) in Surabaya
A Geospatial Analysis Approach

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ABSTRACT

This study aims to estimate the number of traditional coffee shops, known locally as "Warung Kopi" or "Warkop," in Surabaya, Indonesia. Traditional coffee shops play a significant role in the daily social and economic life of Indonesian communities but have received little attention in academic research. This paper utilizes a straightforward geospatial analysis technique to map and estimate the number of these establishments within Surabaya. Using Python for random geographic sampling within the city's administrative boundaries and the Google Places API for identifying relevant coffee shops, this research provides an initial count of Warung Kopi, estimating there to be between 17,000 and 27,000 in the city. This simple yet effective approach offers a replicable method for similar studies in other contexts, providing insights into the scale of informal economies in urban areas.

Keywords: Coffee Shop, Warkop, Surabaya, Google Places API.

1. INTRODUCTION

Coffee shops are ubiquitous around the world, serving as popular social hubs and places of respite in busy lives. The diversity in the coffee culture can be particularly seen in Indonesia, a country renowned not only for its significant export of coffee beans but also for its unique and vibrant coffee consumption traditions (Ompusunggu & Djawahir, 2014). Unlike the global chains that offer a standardized experience, Indonesia boasts a variety of traditional coffee shops known as 'Warung Kopi' or 'Warkop'. These establishments are deeply integrated into local communities and offer a more authentic and localized coffee drinking experience.

Warung Kopi vary significantly from their Western counterparts like Starbucks in terms of ambiance, preparation methods, and the social interactions they foster (Nurhasanah & Dewi, 2019). They are not just places to consume coffee but are cultural institutions that reflect the local way of life. This phenomenon, while well-known locally, has been understudied academically, particularly in terms of its economic implications on a regional and national scale.

Furthermore, Indonesia's coffee shop culture extends beyond Warung Kopi. There are 'Kopi Tiam', a hybrid style influenced by Malaysian, Chinese, and Indonesian cultures, and 'Angkringan' – a unique style found in Yogyakarta and Central Java. In the eastern parts of Java, such as Surabaya and Gresik, the 'Giras' style Warkop prevails. Each of these styles not only serves coffee but also acts as a social gathering spot, which significantly contributes to their cultural and economic importance (Faisal & Hasyim, 2022; Purnomo, Yuliati, Shinta, & Riana, 2021).

This paper seeks to explore the depth and breadth of these traditional coffee shops in Indonesia, with a specific focus on their economic impact. Given the variety and significance of these establishments, understanding their role in the economy could provide insights into the broader economic fabric of Indonesia. The study will particularly focus on Surabaya, using it as a case study to quantify the economic contributions of its local coffee shops.

By examining how these traditional establishments contribute economically, the research aims to highlight the potential of Warung Kopi as key players in not only preserving cultural heritage but also in driving economic growth. The understudied nature of these traditional coffee shops provides a rich vein of academic inquiry that this paper will attempt to mine.

2. RESEARCH METHOD

Our study employs a robust geospatial analysis methodology coupled with data extraction techniques to explore the economic impact of Warung Kopi in Surabaya. This method integrates advanced Python scripting with libraries

such as **random**, **Geopandas**, and the **requests** module for interacting with the Google Places API, offering a thorough approach to both data collection and spatial analysis.

2.1. Geographic Sampling Procedure

The research begins by generating random geographic coordinates within the administrative boundaries of Surabaya. We utilize Python's **random.uniform** function to generate latitude and longitude values within a defined range (Python, n.d.). These boundaries ensure that the coordinates span the entire city, providing a comprehensive overview of potential Warung Kopi locations: Minimum Latitude (South boundary): -7.3769; Maximum Latitude (North boundary): -7.1569; Minimum Longitude (West boundary): 112.6070; Maximum Longitude (East boundary): 112.8970. The Python code for generating a random coordinate within these boundaries is as follows:

Table 1. The Python code for generating a random coordinate

```
import random

def generate_random_coordinate():

    random_latitude = random.uniform(-7.3769, -7.1569)

    random_longitude = random.uniform(112.6070, 112.8970)

    return (random_latitude, random_longitude)
```

2.2. Data Extraction Using Google Places API

After generating random coordinates, we use the Google Places API to locate coffee shops in proximity to each coordinate. The search is narrowed to traditional establishments by focusing on those with "Warkop" in their business names. We define a radius of 1000 meters for each query, which allows us to capture all relevant coffee shops within a walking distance around each point. This radius is significant as it ensures that we are covering enough area to assess the economic activity generated by these coffee shops without overlapping too much into neighboring areas. Here's how we interact with the Google Places API using the **requests** library (Requests, n.d.):

Table 2. Interactiom with the Google Places API using the **requests** library

```
import requests

def find_nearby_warung_kopi(latitude, longitude, api_key):

    endpoint_url = "https://maps.googleapis.com/maps/api/place/nearbysearch/json"

    params = {

        'location': f'{latitude},{longitude}',

        'radius': 1000,  # Define the search radius in meters

        'keyword': 'Warung Kopi',

        'key': api_key

    }

    response = requests.get(endpoint_url, params=params)

    results = response.json().get('results', [])

    return results
```

2.3. Validation with Geospatial Data

To validate and refine our geographic data points, we utilize a shapefile of Surabaya, sourced from DIVA-GIS, which provides detailed geographical representations of the city. The shapefile is processed using **Geopandas**, a library that excels in handling and analyzing geographic data (GeoPandas, n.d.; Gillies & contributors, n.d.). We use this data to confirm that each random point falls within a commercial zone suitable for Warung Kopi establishments, ensuring that our dataset accurately represents viable commercial activity areas. The code snippet for integrating the Surabaya shapefile and verifying the points is:

Table 2. Code snippet for integrating the Surabaya shapefile and verifying the points

```
The code

import geopandas as gpd

from shapely.geometry import Point


# Load the Surabaya shapefile

surabaya_shapefile = gpd.read_file("path_to_shapefile/ADMINISTRASIDESA_AR_25K.shp")


# Check if a point is within the commercial areas of Surabaya

def is_within_surabaya(point, shapefile):

    return shapefile.contains(point).any()


# Example usage

point = Point(random_longitude, random_latitude)

if is_within_surabaya(point, surabaya_shapefile):

    print("The point is within a commercial area.")
```

Figure 1 visualizes the sample points inside the geographical area of Surabaya, it helps the authors to understand whether the program runs correctly and sampled reasonable sample points.
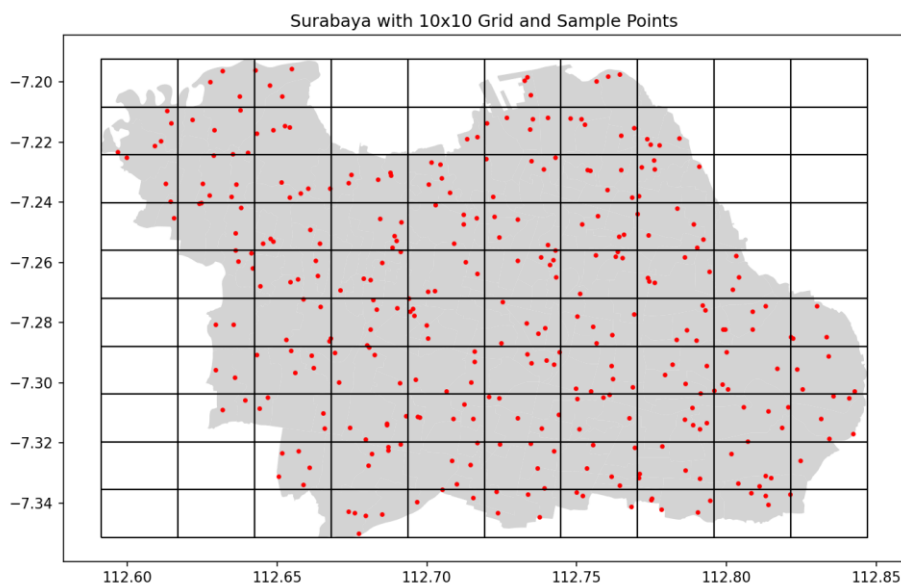
Figure 1 Surabaya Sample Points

3. RESULTS AND DISCUSSIONS

This study found that there are 17,000-27,000 traditional coffee shops, known locally as "warkop" in Surabaya. This significant number underscores a substantial impact on the local culture, the economy, and the development of small and medium enterprises (SMEs). Notably, most of these warkops are not managed by formal corporations but are predominantly operated by individual entrepreneurs or family-run businesses. This characteristic highlights their role as vital components of the grassroots economy, pivotal in shaping the socio-economic landscape of Surabaya.

These traditional coffee shops are integral to the local community's daily fabric, serving as key social hubs and supporting livelihoods by employing local residents and sourcing indigenous products. The methodology employed in this study, as detailed in the previous chapter, utilized random geographic sampling and advanced data extraction techniques. This approach has proven effective in identifying dense clusters of warkops and analyzing their spatial distribution across Surabaya, revealing their widespread accessibility and significant cultural and economic roles.

The comprehensive geospatial analysis, combined with data from the Google Places API, has not only mapped the current landscape of warkops but has also set a foundational methodology for future urban economic studies. Future research can adapt this methodology to examine other sectors within the informal economy or apply it in different urban settings to assess the impact of similar grassroots businesses. The use of such advanced data collection and analysis techniques offers a replicable model for other researchers looking to conduct detailed urban economic analyses with a focus on SMEs.

4. CONCLUSION

The extensive network of warkops in Surabaya not only illustrates their importance as cultural staples and economic catalysts but also demonstrates how methodologically rigorous research can inform policy and empower economic sectors at the margins. This study's approach offers a valuable template for future research aiming to understand and support the myriad ways in which small-scale, informal businesses contribute to urban economies.

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