



PROJECT
SPARTA

NOVEMBER 2023

Mapping Underemployment: A Predictive Modeling Approach to Analyzing Patterns

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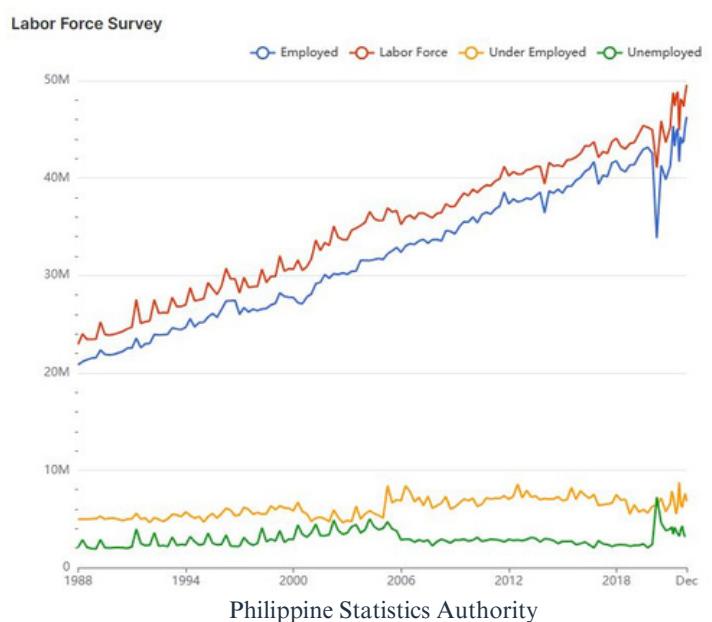
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Introduction

Underemployment in the Philippines is a significant issue affecting many workers. It is not just about having a job but also the quality and stability of that job. Many employees face challenges such as not having enough working hours or being overqualified for their positions. This paper explores the impact of underemployment on workers in the Philippines, specifically focusing on my local area, Cebu. Understanding the nuances of underemployment at the local level is crucial for tailoring interventions to address the unique challenges faced by the workforce in this region. By narrowing our focus, we aim to provide insights that can inform local policymakers, businesses, and community leaders about the specific underemployment patterns in Cebu.

Moreover, this study delves into the benefits of using a predictive model to understand and address these patterns. Predictive modelling offers a proactive approach to dealing with underemployment by anticipating trends and identifying potential risk factors. In doing so, we hope to contribute not only to the academic understanding of underemployment but also to the development of practical strategies that can be implemented at the local level to enhance job quality and stability in Cebu.

Underemployment Rate in the Philippines by Year



Statement of the Problem

This research tackles the underemployment issue in the Philippines, particularly in Cebu, where workers deal with problems like not having enough work hours or being overqualified for their jobs. The main problems are that we don't really understand underemployment at the local level in Cebu, and people like policymakers and businesses might not know the specific issues faced by our local workforce.



The study wants to figure out these local challenges and suggest practical ways to help by using a predictive model. This way, we can not only learn more about underemployment in Cebu but also help our local leaders and businesses make better decisions to improve job stability and quality.

Objectives

Geographical Analysis:

- Which specific area in Cebu currently exhibits the highest underemployment rate, and how does it compare to the national average?
- Are there specific factors contributing to the high underemployment rate in this area?

Localized Solutions:

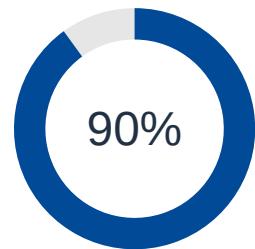
- How can tailored strategies be developed to address the specific underemployment issues in this locality?

Predictive Modeling:

- How can a predictive model be designed to analyze underemployment patterns in Cebu?
- What historical data and variables should be considered in developing the predictive model?

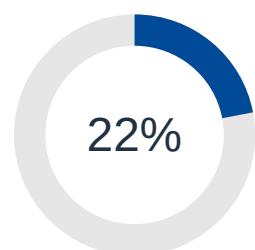
Prescriptive Analysis:

- What actionable insights does the predictive model provide to decrease underemployment in the specified local area?
- What practical interventions can be recommended based on the prescriptive analysis to effectively address underemployment challenges in this specific locality?



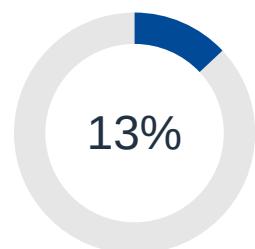
GOAL 1

Target 90% respondents using Pareto Chart



GOAL 2

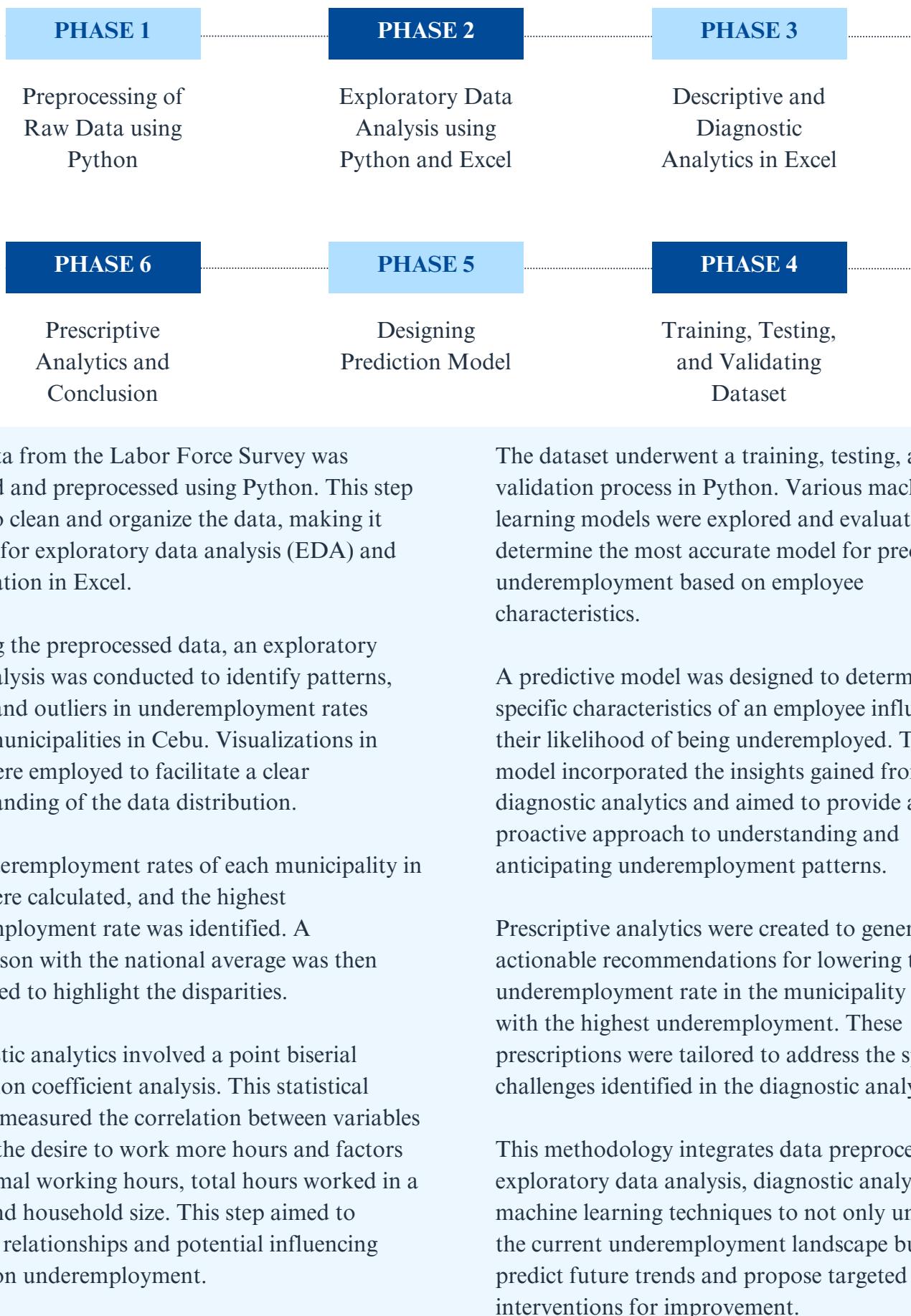
Analyze patterns from 22% respondents who want more work in the City of Mandaue



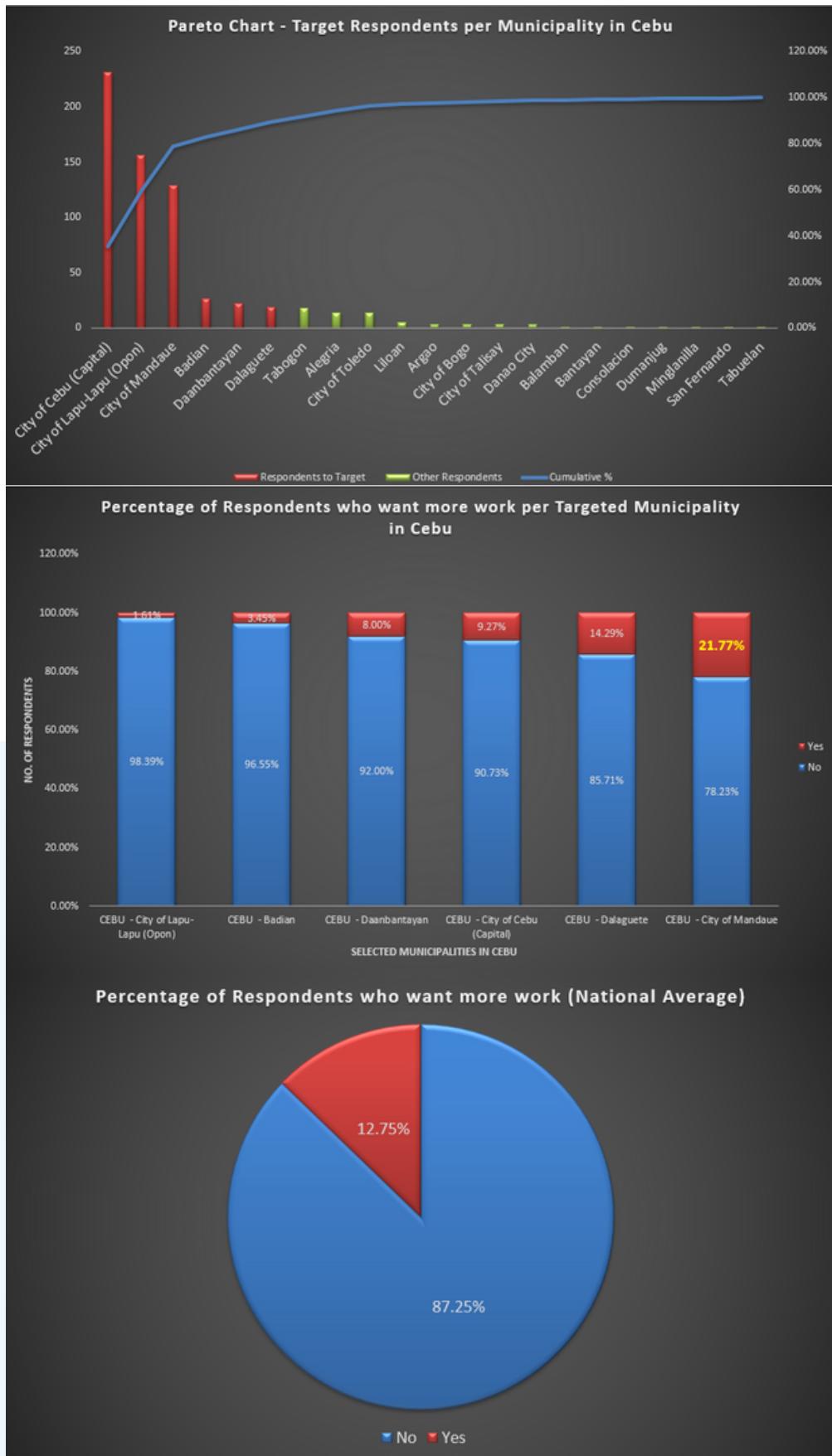
GOAL 3

Make a prescription to bring down underemployment rate to 13% in the City of Mandaue

Methodology and Analyses



Charts



Results and Discussion

Use this Model for Prediction

```
In [*]: # Call the function to make a prediction  
predict_want_more_hours(model)  
  
Enter Region:   
  
Fill out the model for prediction  
Once done press ctrl + Enter to start another prediction
```

I've developed a user-friendly prediction model using the Labor Force Survey dataset, employing the SVM model which had the highest accuracy based on testing.

Use this Model for Prediction

```
In [*]: # Call the function to make a prediction  
predict_want_more_hours(model)  
  
Fill out the model for prediction  
Once done press ctrl + Enter to start another prediction  
Enter Region: Region VII (Central Visayas)  
Household Size: 4  
Enter Relationship to Household Head: Head  
Enter Sex: Male  
Enter Age Group: 35-44  
Enter Marital Status: Married  
Enter Highest Grade Completed: College Undergraduate  
Enter Major Occupation Group: Craft and Related Trades Workers  
Enter Major Industry Group: Manufacturing  
Enter Nature of Employment (Primary Occupation): Permanent Job  
Normal Working Hours per Day: 8  
First time to do any work (0 or 1): 0  
Other Job Indicator (0 or 1): 0  
Total Hours Worked in a Week for all Jobs: 40  
  
Enter Reasons for Working More than 48 Hours during the past week:  Wanted more earnings
```

To predict underemployment, simply input the employee's details in the provided fields. Include information on their region, household size range, age, industry, occupation group, and other characteristics.

Use this Model for Prediction

```
In [9]: # Call the function to make a prediction  
predict_want_more_hours(model)  
  
Fill out the model for prediction  
Once done press ctrl + Enter to start another prediction  
Enter Region: Region VII (Central Visayas)  
Household Size: 4  
Enter Relationship to Household Head: Head  
Enter Sex: Male  
Enter Age Group: 35-44  
Enter Marital Status: Married  
Enter Highest Grade Completed: College Undergraduate  
Enter Major Occupation Group: Craft and Related Trades Workers  
Enter Major Industry Group: Manufacturing  
Enter Nature of Employment (Primary Occupation): Permanent Job  
Normal Working Hours per Day: 8  
First time to do any work (0 or 1): 0  
Other Job Indicator (0 or 1): 0  
Total Hours Worked in a Week for all Jobs: 40  
Enter Reasons for Working More than 48 Hours during the past week: Wanted more earnings  
Prediction: The respondent is not likely to be underemployed.
```

Once all details are filled in, the model will efficiently determine whether the employee is underemployed or not. It's an easy and effective tool for making predictions based on key factors.

Results and Discussion

Actual	City of Mandaue	National
Underemployed	32	2649
Not Underemployed	115	18124
Total Employed	147	20773
Percentage	21.77%	12.75%
Difference	9.02%	

The investigation into underemployment rates across municipalities in Cebu revealed that the City of Mandaue possesses the highest underemployment rate, standing at 21.77%. This finding is particularly significant as Mandaue is a notable manufacturing hub in Cebu.

The underemployment rate in the City of Mandaue is notably higher than the national average, which is recorded at 12.75%. This indicates a substantial difference of 9.02%, highlighting a significant underemployment challenge specific to this locality.

In an effort to ensure the accuracy of the underemployment rate prediction, diagnostic analytics were employed. Specifically, an examination of the correlation between respondents desiring more work hours and the actual number of hours worked was conducted. The results indicated a moderate negative correlation, emphasizing that those who expressed the desire for additional hours were correlated with working fewer hours, contributing to the accuracy of the underemployment prediction.

The high underemployment rate in the City of Mandaue is particularly noteworthy given its status as a manufacturing hub. This finding prompts a deeper exploration into the unique factors contributing to underemployment in a locale recognized for industrial activity.

Results and Discussion

Solver		
City of Mandaue		Used Solver to Minimize the difference
Underemployed	32	19
Not Underemployed	115	128
Total Employed	147	147
Underemployment Rate	21.77%	12.93%
National		
Underemployed	2649	2649
Not Underemployed	18124	18124
Total Employed	20773	20773
Underemployment Rate	12.75%	12.75%
Mandaue Underemployment Rate	21.77%	12.93%
National Underemployment Rate	12.75%	12.75%
Difference:	9.02%	0.17%

Employing Solver in Excel, an optimization approach was utilized to minimize the difference between the underemployment rate in Mandaue City and the national underemployment rate. The objective was to identify a prescribed value for the underemployed in Mandaue City that would bring this difference as close to zero as possible.

The outcome of the Solver analysis revealed that, in order to achieve alignment with the national underemployment rate, the prescribed value for underemployed individuals in Mandaue City should be 19. This represents a marked difference of 13 from the actual underemployed count in Mandaue City.

Results and Discussion

City of Mandaue		No. of Underemployed
Craft and Related Trades Workers in Manufacturing		6
Service and Sales Workers in Wholesale and Retail Trade		7
Total Underemployed		13
Actual Underemployed	Prescribed Underemployed	Difference
32	19	13

Given the identified difference of 13 in the underemployment rate between Mandaue City and the national average, a focused analysis was conducted to determine the specific industry and occupation groups contributing to this gap.

The examination revealed that the Craft and Related Trades Workers in the Manufacturing industry group had a underemployed count of 6. Additionally, Service and Sales Workers in the Wholesale and Retail Trade industry group had a underemployed count of 7.

The cumulative underemployed count of 13 within the Manufacturing and Wholesale and Retail Trade industries correlates precisely with the identified difference. This alignment suggests a strategic focus on these industry and occupation groups in Mandaue City to decrease the underemployment rate and bring it in line with the national average.

Conclusion

To effectively address underemployment in Mandaue City, tailored interventions can be developed for the Craft and Related Trades Workers in Manufacturing and the Service and Sales Workers in Wholesale and Retail Trade. This may involve industry-specific training programs, collaboration with local businesses, and initiatives to stimulate job growth in these sectors.

Engaging stakeholders, including local businesses, educational institutions, and government agencies, is crucial for the success of targeted interventions. Collaboration can foster the development of sustainable solutions that address the unique challenges faced.

In conclusion, the targeted industry and occupation analysis provide actionable insights for strategic interventions to decrease the underemployment rate in Mandaue City. By focusing on Manufacturing and Wholesale and Retail Trade, there is a tangible opportunity to align the underemployment rate with the national average and foster sustainable economic development in these crucial sectors.



Recommendation

CONTINUOUS MONITORING AND ADAPTATION

The proposed interventions should be subject to continuous monitoring and adaptation. Regular assessments of their effectiveness, coupled with adjustments based on changing economic and industry conditions, will be essential for achieving and maintaining the desired reduction in underemployment.

QUALITATIVE ANALYSIS OF WORKER PERSPECTIVES

Undertake a qualitative analysis to explore the perspectives of underemployed workers in Mandaue City. Conduct interviews, focus groups, or surveys to gather in-depth insights into the experiences, challenges, and aspirations of individuals within the identified industry and occupation groups.

ENHANCING PREDICTION MODEL ROBUSTNESS

For future researchers looking to improve a predictive model for underemployment, it's recommended to validate the model across diverse subsets and demographics to ensure generalizability. This effort aims to create a more adaptable, accurate, and user-friendly model that can effectively predict underemployment based on employee characteristics.

References

LABOR FORCE SURVEY FROM THE PHILIPPINE STATISTICS AUTHORITY

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