



A nowcasting model for Medellín city

This research is part of the project: *economic challenges of Latin American Cities within the framework of the SDG, a disruptive vision on how to tackle them.*

*María Camila Vásquez Correa**

*PhD. Juan Carlos Duque***

*PhD. Jairo Alejandro Gómez****

* *Mathematical Engineering student- mvasqu49@eafit.edu.co*

** *Research group in Spatial economics - jduque1@eafit.edu.co*

*** *Research group in Spatial economics - jagomeze@eafit.edu.co*

Context

The macroeconomic variables (GDP, inflation, unemployment rate, trade balance, etc.) influence the design of public policies in every country.

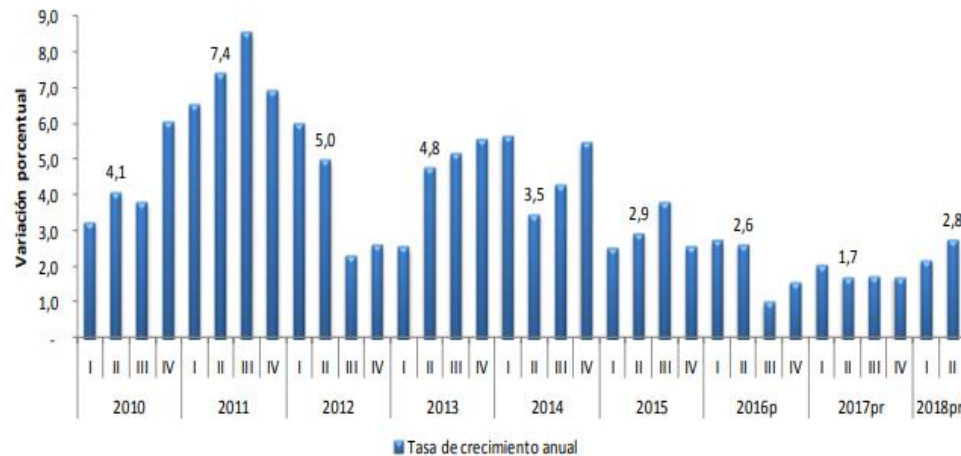


Figure 1: Annual GDP growth rate. Second quarter (DANE).

A matter of time

Local governments have access to a **monthly** unemployment rate that brings a delay of **two months**.

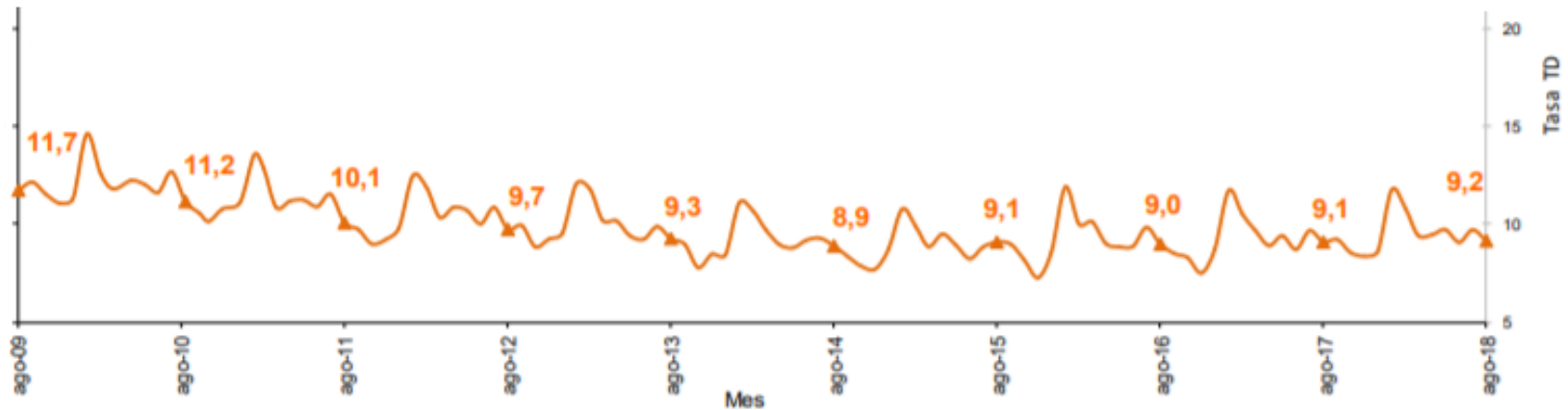


Figure 2: Unemployment rate, cut June 2018 (DANE).

Nowcasting

Previous models:

- Data from conventional sources. (Bragoli & Modugno 2017) and (Urasawa 2014).
- Large geographical scale: GDP (Lahiri & Monokroussos 2013, Karim et al. 2010, Modugno et al. 2016).
- Urasawa, Satoshi. 2014. Real-time GDP forecasting for Japan: A dynamic factor model approach. *Journal of the Japanese and International Economies*, 34, 116 – 134.
- Bragoli, Daniela, & Modugno, Michele. 2017. A now-casting model for Canada: Do U.S. variables matter? *International Journal of Forecasting*, 33(4), 786 – 800.
- Lahiri, Kajal, & Monokroussos, George. 2013. Nowcasting US GDP: The role of ISM business surveys. *International Journal of Forecasting*, 29(4), 644 – 658.
- Karim, Barhoumi, Olivier, Darn ´e, & Laurent, Ferrara. 2010. Are disaggregate data useful for factor analysis in forecasting French GDP? *Journal of Forecasting*, 29(1-2), 132–144.

Objective

Diagnosis of the current status of the city economy using different data sources, without delay and with a higher frequency, by nowcasting the unemployment rate.

This, in order to provide information to generate precise and efficient policies to reduce the unemployment rate and contribute to de SDG 8: *promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (ONU).*

Specific Objectives

- Extend the current detection model to handle all the vehicle categories of interest and to get reliable time series of their counts in image sequences.
- Design and develop analyses to understand and characterize the most representative vehicle counts from available categories across Medellín.
- Design a strategy to improve unemployment predictions by fusing historical records with spatially distributed vehicle counts.

A different approach

The number and distribution of motor vehicles on the streets of a city can be used to estimate roughly economic activity, and therefore, unemployment.



Figure 3: Left: normal vehicular flow. Right: vehicular flow during an economic crisis.

Scope 1/3

Research practice 1: forecasting unemployment using historical values and building a vehicle detection model.

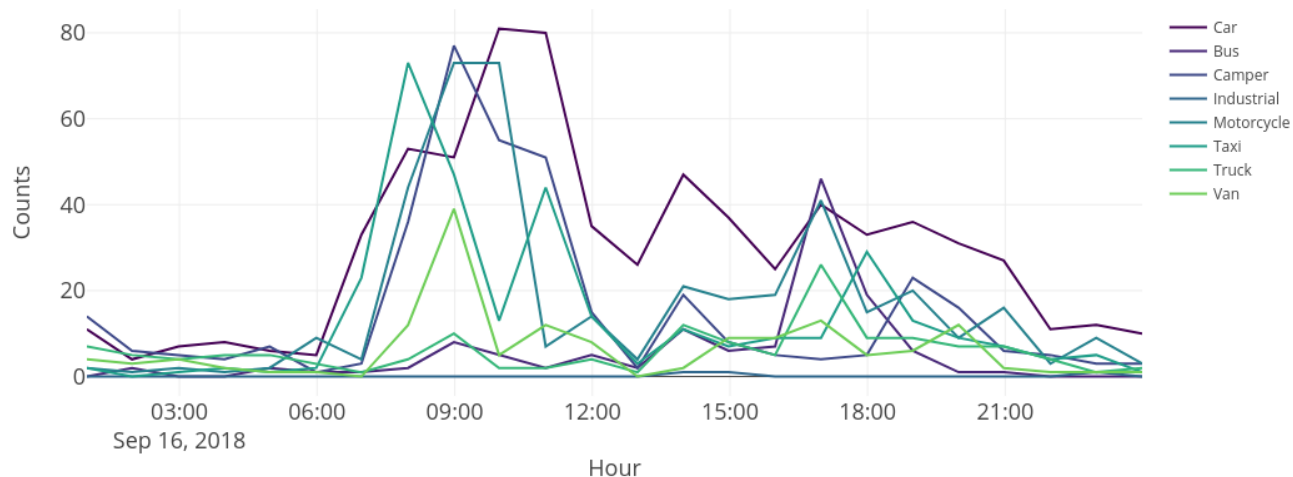
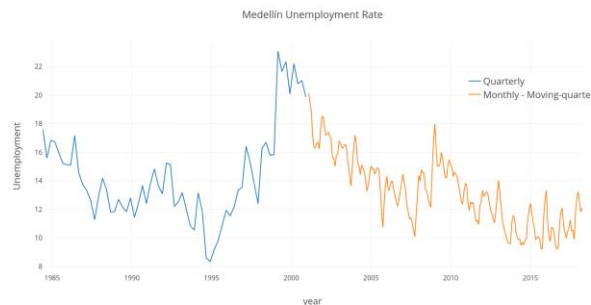
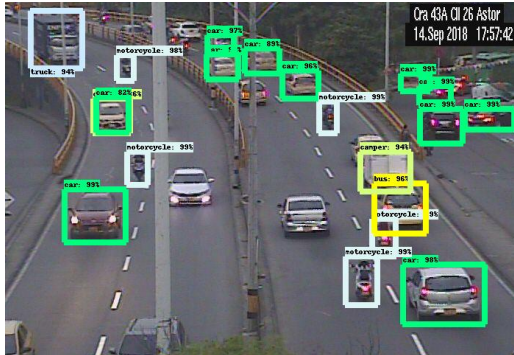


Figure 4: Hourly counts of vehicles per category extracted from a single camera during an entire day using the re-trained Single-Shot Detector.

Scope 2/3

Research practice 2: forecasting unemployment along with the data from the counts of the vehicles. Is this information really significant?



New forecasting model.

Options:

- Machine learning.
- VAR model

Figure 5: Using counts and the historical unemployment rate a new model is trained.

Scope 3/3

Research practice 3: Forecasting unemployment using vehicle counts only.

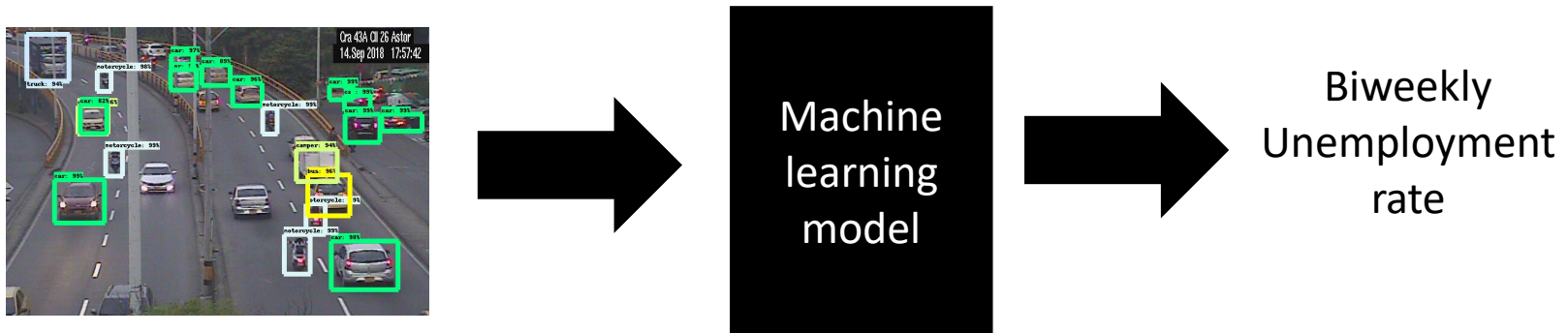


Figure 6: Using counts, a machine learning model is trained to produce a biweekly forecast of the unemployment rate.

Schedule 1/2

1. Writing the present research proposal.
2. Label the missing classes and re-train the selected model.
3. Validate the trained model in order to determine its performance in multiclass detection.
4. Data analysis:
 1. Generate a time series for each category with the trained model.
 2. Analyze the correlation between the series of the categories in the same location.
 3. Analyze the correlation between the series of different locations for the same category.
 4. Analyze the correlation between the series of different locations for all the categories for all the time available.
 5. Analyze the behavior of the series of the different categories in different locations in search of outliers and dynamics
5. Evaluate the regression of the unemployment rate according to the time series of the counts.
6. Continue writing the final paper.

Schedule 2/2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1																			
2																			
3																			
4																			
5																			
6																			

Table 1: Schedule Overview.

Thank you for your attention!

Any questions?

María Camila Vásquez Correa - mvasqu49@eafit.edu.co

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PhD. Jairo Alejandro Gómez - jagomeze@eafit.edu.co

