Urban Growth Modeling for Los Angeles Metropolitan Statistical Area
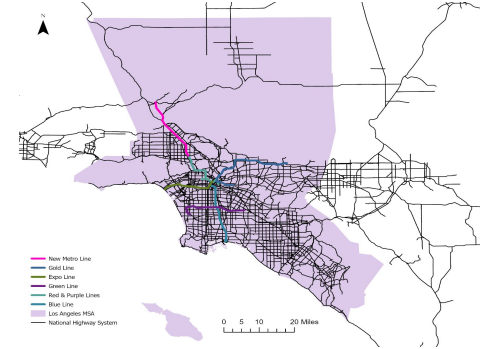
CPLN 675 Land Use and Environmental Modeling

Introduction

As the regional population continues to grow in Los Angeles, it's crucial for the local organization to forecast the urban growth and plan for future development. We are going to provide a prediction model which is suitable for forecasting both the demand and supply side change. Land cover, transportation, and population data is used to ensure the model is sensitive to a diverse range of variables.

Los Angeles

Orange

Demand forecast

In this scenario, a new metro line extending out to Santa Clarita will be built, where we anticipate there to be room for new development and an interest in a better connection to the concentration of jobs closer to downtown LA. It will have the potential to ease congestion on a major highway artery (the I-5), make for faster and more pleasant commutes for those who go between the city of Los Angeles and Santa Clarita

New Metro Line
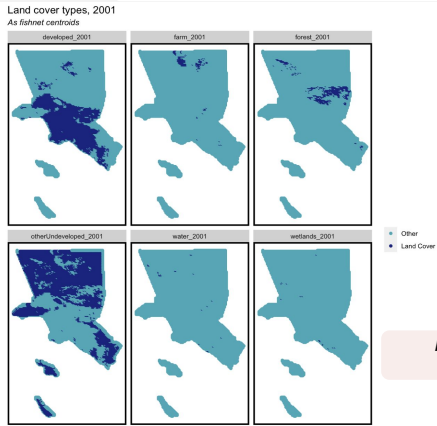Gold Line
Expo Line
Green Line
Red & Purple Lines
Blue Line
Los Angeles HSA
National Highway System

0 5 10   20 Miles

Data Exploratory

Land cover types, 2001
As fishnet centroids

developed_2001 farm_2001 forest_2001

otherUndeveloped_2001 water_2001 wetlands_2001

Other
Land Cover

Figure 1 Land cover in 2001

New development as a function of the countinuous variables

dev_lag_avg   road_dist

Value

lc_change_reclass

No Change
New Development
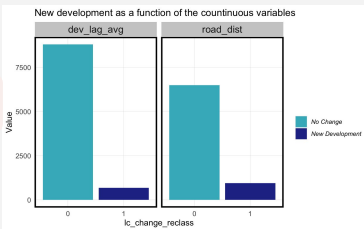
Figure 2 New development v.s. Highway variables

New development as a function of factor variables

pop_2000   pop_2011   pop_Change

Value

lc_change_reclass

No Change
New Development
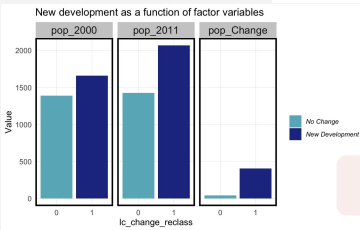
Figure 3 New development v.s. population variables

Modeling

	Dependent variable:
	Development prediction
wetlands_2001	3.167***
forest_2001	-7.816
farm_2001	0.613
otherUndeveloped_2001	1.508***
dev_lag_avg	-0.001***
pop_Change	0.001***
road_dist	0.007*
road_var_dist	-0.007*
metro_dist	0.081***
metro_lag_var_dist	-0.081***
Constant	-3.664***
Observations	4,450
Log Likelihood	-314.135
Akaike Inf. Crit.	650.270

Note: *p<0.1; **p<0.05; ***p<0.01
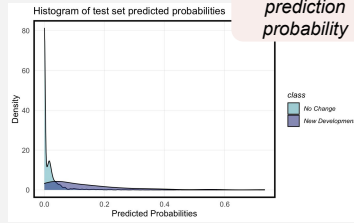
Figure 4 model summary

Histogram of test set predicted probabilities

Density

Predicted Probabilities

class
No Change
New Development

Figure 5 prediction probability

With a threshold of 0.09, the model achieve a accuracy of 95%, a sensitivity of 0.5, a specificity of 0.96

Development Demand in 2021: Predicted Probabilities

Quintile Breaks
0.00
0.00
0.00
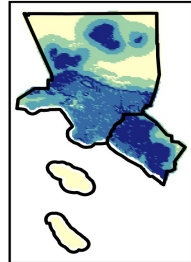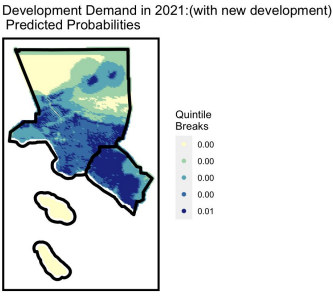0.01
0.02

Figure 6 development demand in 2021 (demand side)

Development Demand in 2021:(with new development)
Predicted Probabilities

Quintile Breaks
0.00
0.00
0.00
0.00
0.01

Figure 7 development demand in 2021 with new metro line (supply side)

Allocation Strategy

Principle:
- protect sensitive land
- Focus on demand for growth

Development Potential, 2021: Los Angeles

Development Demand
0.000
0.000
0.000
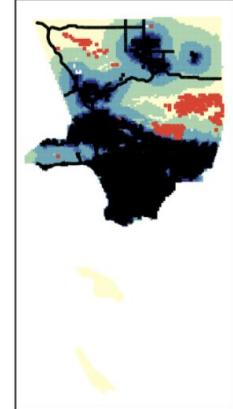0.004
0.019

Land_Use
Developed
Not Suitable

Figure 8 development potential - LA

We ultimately found that there was potential for development in northern Los Angeles County and throughout much Orange County.

Development Potential, 2021: Orange

Development Demand
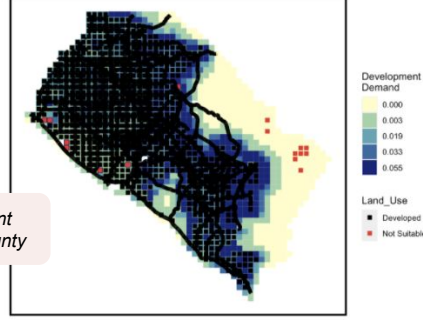0.000
0.003
0.019
0.033
0.055

Land_Use
Developed
Not Suitable

Figure 9 development potential - Orange county

Poster made by Zirui Chen