UC GIS Week
Thursday, November 21, 2024
3 pm-4 pm
GIS for Policy: Health, Transportation, and Zoning

Sessions:

Hi everyone, we're going to give it just another minute or so for some folks to trickle in before we start.

All right. Welcome everybody for our final set of talks for UC GIS Week 2024. Thank you all for being here today. It's really wonderful to have folks here. We're going to have four today, and I want to remind folks, if you have questions, please leave your questions in the chat, and then we'll address questions after all four of our presenters have had the chance to speak.

And I'm excited to welcome Lucas Michel of UC Davis for our first talk right now. I'm really excited to hear about this. He's going to present on analyzing the impact of COVID-19 on college enrollment rates across California high schools, using a geospatial approach.

So, Lucas, take it away.

Analyzing the Impact of COVID-19 on College Enrollment Rates Across California High Schools: A Geospatial Approach

Speaker: Lucas Michel – UC Davis

Abstract:

This study examines the impact of various demographic and socioeconomic factors on college enrollment rates among high schools across California, with a primary focus on how the COVID-19 pandemic altered these trends. By analyzing county-level enrollment data before and during the pandemic, we identified key patterns related to gender, race, and socioeconomic status. The research further investigates the correlation between the Social Vulnerability Index (SVI) and income levels, highlighting geographical disparities and pinpointing counties most affected

by the pandemic. Data from the California Department of Education and the Agency for Toxic Substances and Disease Registry (ATSDR)/Centers for Disease Control and Prevention (CDC) was utilized to perform a geostatistical analysis. A paired t-test was conducted to evaluate the significance of changes in enrollment rates across counties pre- and post-pandemic. Additionally, polynomial regression was employed to trace enrollment trends, assessing the overall significance of the pandemic's impact. This study provides crucial insights into spatial disparities in college enrollment across California, particularly in the context of COVID-19, offering valuable implications for education policy and resource allocation.

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So here we have analyzing the impacts of the program team, college enrollment rates across California high schools, a geospatial bridge.

So, in this, we start by looking at college enrollment trends across California counties from 2015 to 2022.

This data was collected from the California Department of Education.

And this figure highlights the percent of students enrolled in college within 12 months after graduation.

Each year there's some slight variation, but there's an overall trend and key consistencies.

The counties like Marin, San Mateo, located here in the Bay Area, with some of the highest college enrollment rates, whereas counties like Inyo,

Del Merta, and Mona, which have some of the lowest college enrollment rates.

And in these next figures, we break down enrollment across categories, including UC, CSUs, community college, and out-of-state options, along with two-year universities.

By normalizing this data, we can directly compare counties. This helps us see where students go after graduation and highway counties go strong, and we call it going rates.

The pie chart is an added detail that shows the overall trend of California from 2014 to 2022.

This other chart then focuses on demographic factors, examining enrollment patterns by ethnicity, gender, and socioeconomic status.

And you can see the disparities of non-native English speakers and students with disabilities, with those groups having some of the highest non-going college rates.

In this next figure, we difference the enrollment rates from pre-COVID versus during COVID enrollment.

Most counties experienced decline, but there are counties like Sierra and Mendocino that actually showed an increase in college enrollment, with about a 6 and 5 percent increase, respectively.

But on the other hand, the counties like Sizoku and Merced had large negative decreases, with about a 15 and 14 percent decrease in college enrollment.

This showed that there's a much more severe negative impact on college enrollment from COVID. And then using this data, we conducted a paired t-test, which determines which counties were statistically significant, we difference. And you can see that by the batch lines and the single batch lines showing the 99th and 95 percent progress in the voice.

Then we made the graph that compares percent change in college enrollment during the pandemic to pre-COVID averages.

It was divided into four quadrants showing counties with positive or negative change related to their baseline.

For example, the bottom left quadrant highlights counties that were severely negatively changed while starting off with the below average enrollment. And the counties in the top right showing either very minimal negative change or positive change that already started in a high above average college enrollment.

And then based off the previous figure, we've...

Oops.

I forgot that.

In building up the previous figure, incorporated social vulnerability index into our analysis.

Counties with high vulnerability are shown in red, which experienced a much greater decline with the majority of them being in the bottom left quadrant.

And then conversely, counties with lower vulnerability shown below tend to either be clustered around the middle or top right, showing that they either experience a very minimal difference or positive growth.

And then lastly, based off the previous two figures, we explore enrollment change through the lens of counties' income levels.

Low income counties, typically on the left end of the trend line, experience sharper decline.

There's higher income counties clustered in the top right showing more resilience.

Although this figure doesn't align perfectly with the quadrant based trend, there is still emphasis on economic disparities and pandemic related enrollment changes.

Overall, this analysis showed that COVID did have a pretty significant impact on college enrollment. There are key factors to look at, like things that we have actually showed growth still during these hard times and then counties that were much more significantly impact despite having better off conditions.

Thank you so much for your time.

Thank you so much, Lucas. And just a reminder again, please leave questions in the chat and we will address them at the end of all of our session for the afternoon.

Next up, I want to welcome Debby Oh from UC San Francisco. And Debby is going to talk about a health app, visualizing place-based data to identify and address health disparities.

So you take it away.

Health Atlas: Visualizing Place-Based Data to Identify and Address Health Disparities

Speaker: Debby Oh – UC San Francisco

Abstract:

The UCSF Health Atlas (healthatlas.ucsf.edu) is an interactive mapping website that helps users explore place-based characteristics and see how they relate at a population level across the United States. Health Atlas includes data from all 50 states in the U.S., the District of Columbia, and Puerto Rico. The tool visualizes data at the census tract, ZIP code, congressional district, county, CBSA, PUMA, and state level. Health Atlas is built upon a curated database of over 120 nationally available variables including data from the American Community Survey (e.g., demographics, socioeconomics), CDC PLACES (e.g., health and health care), EJ Screen (e.g. environmental exposures), and other sources (e.g., structural racism, income inequality, built environment).

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All right. Thanks. So my name is Debby Oh and I'm based out of UCSF and our team has been working on this health atlas for about five years now. So you may have seen a presentation on this many, many years ago at UC GIS week. But just this year, we've expanded from California to all 50 states, DC and Puerto Rico. So that's why I'm excited to share with you what we have in our map.

So here's the URL health atlas.ucsf.edu. We do have a mobile version, but the desktop version is a lot more full featured. So you can check it out.

And what health atlas is, it's an interactive map. We have over 120 variables on the back end. And you can see these different variables at seven different geographies, but also sliced by

2020 census and census 2020 geographies. You can compare it to variables. It's just like a really good way to explore data. And you can also download data and maps.

So on the back end, we have, you know, as I said, 120 variables and we organized them into these five categories. So demographic, socioeconomic, neighborhood, environment, and health and health care. So this is loosely based on a social determinants or social drivers of health framework, because we believe that place matters and it's really important to understand what is happening in a neighborhood and how that place might affect health.

This data is taken largely from public sources. So this is American Community Survey data, CDC Places, EPA Environmental Justice screen. We are kind of like a middleman where we're just curating data from different sources that we think is reliable and useful for work in public health. And we're putting it all in one place so that the users can kind of explore, figure out what they want, and then kind of use the maps and data for their own work.

So this is what the map looks like. Here's an example of extremely low income households and disability. So you'll see that there's a scatter plot to show you the distribution. There's also histograms to kind of show you what's happening. And of course, there's the map. This is kind of the lower 48, but if you want to look at Alaska, Hawaii, or Puerto Rico, there's those little icons in the bottom right corner and that will take you there.

There is a way that you can zoom in on particular states. So you can kind of filter down to a state. And so this is California. We worked with the UC Center for Climate and Health Equity to get climate data. We do have national climate data, but we have specific climate data for California. And this is one of the variables of average max temp. And you can see that if you have just one variable, the darker blue indicates a higher value.

If you add in another variable, so this is neighborhood deprivation index, there's a darker yellow color for higher values of the neighborhood deprivation index. And for areas that have higher values of both, it's of course a darker green. And one thing that you can do with the health atlas is that you can kind of play with the scatter plot. So if you're interested in one particular outlier, you can click on it, or you can highlight the thoughts that you're interested in in the scatter plot and it'll highlight it in the map. And so this is one easy way to identify at risk communities.

Because we have 120 variables, it's sometimes hard to find what you want. And so there's different ways to search. You can, of course, just type it in. But we also have these tags. So in addition to those five categories that I showed you, like some of the variables we have go across categories. So for things like cancer, children, climate, heart disease, and older adults, we added little tags to make it easier to find the data. So this example shows you climate, the climate tag, and it shows you, oh, you know, PM 2.5, ozone, diesel, you know, all these different things that fall under that category.

Okay, so if you're interested in a particular area, so I live in San Francisco, and this is the nine counties that touch the bay. So that's the bay area. And if I want to know, you know, like

population weighted estimate for these two variables, extremely low income household and disability.

Health Atlas can give you that like super fast, it kind of calculates it on the back end so that you can use this data for if you're writing a proposal or a grant, or just trying to speak to policymakers, you can see that oh, in the bay area 15.5% of residents are extremely low income household, or you know 10% disability.

So you can see that in the in the scatter plot, and then in the histogram, and then like that orange dot or the orange line indicates the values for the selected region.

And lastly, for those of you who are researchers, which there's probably a lot of you out there,

you can export the data to use for your own work. So if you have geocoded data, you know, that is that census tract level or zip code level. We actually, sorry, this is an older screenshot but we also have PUMAs, CVSA's, congressional districts, you can kind of append the data, append your data to what exists in the Health Atlas and do an analysis.

And I just wanted to quickly run through what is in the map, you know, these are kind of boring slides but for those of you who are are really data people, it might just be interesting, interesting to know what's in the map. We have age and sex, you know, that's pretty straightforward. And it's what is available through the American Community Survey. We have fairly detailed race and ethnicity. You can see that it's not just, you know, Asian American, black, Hispanic, or Latino and white, but we have, if you want to know East Asian or if you want to get even more granular, you can see percent Chinese.

Under social economic data, we have various indices. So like I showed you the neighborhood deprivation index, but there's also also the social vulnerability index, which was mentioned earlier.

There's different measures of poverty, income inequality, employment, education, digital access.

We also have neighborhood data, which is like a big umbrella, just basic household data, language and ethnic enclave data, a lot of housing data,

built environment, segregation, structural racism, so like historical redlining, morality, transit data.

And lastly, we have, as I mentioned before, oh, actually, not lastly, we have environmental data, all the variables in green we have for California only, we're hoping to have the data for the entire country at some point, but for now, those are special to California.

And then we also have a lot of health and healthcare data, thanks to the CDC places and these come at different geographic levels, all the way down to the census tract. Okay, and I just wanted to mention that this has been a team effort over many years and we're really hoping

that you are able to use it, it is absolutely free and it is our greatest hope that you make it make use of it for your for your interesting and impactful work. And that is it.

Thank you so much, Debby, I am already super excited to add this to my lib guides and to share it with some of my colleagues too. This is really, really handy tool, and it looks fantastic, which is always a fun one. Thank you. So, our next speaker is going to be Catherine Brinkley of UC Davis, and Catherine is going to present on the data for land use planning, the plan search tool in the California zoning.

GIS data for Land-use planning: the PlanSearch tool and California Zoning Atlas

Speaker: Catherine Brinkley – UC Davis

Abstract:

Plans and zoning maps are often sequestered on the individual webpages of local jurisdictions, complicating efforts to assess planning outcomes in aggregate, compare plans for inspiration in drafting updates, or monitor ongoing promises. Ultimately, adopted comprehensive plans commit the local government to long-term zoning, financing and development goals that guide the fortunes and health of the jurisdiction for the next ten to forty years. The lack of easily accessible data and oversight often causes even the loudest advocates of plans and planning to sometimes lament that the plan as a document is ineffectual. Nevertheless, their content represents years of considerable community input through participation in advisory committees and public meetings. Plans can also legally obligate local jurisdictions to act. To empower communities to make more informed plans and provide greater accountability for created plans, this talk showcases new planning data infrastructure throught he California Zoning Atlas and PlanSearch (PlanSearch.caes.ucdavis.edu).

Plansearch allows users to search across 58 county and 482 city general plans in California. Users can note that while nearly every plan mentions the term “golf course”, the term “climate justice” is rarely mentioned. Such efforts open greater opportunities for natural language processing and rapid plan evaluation. Similarly, the National Zoning Atlas represents a multi-state effort to stitch together the zoning maps of local jurisdictions with the primary objective of understanding where single family zoning spurs segregation. Such efforts help provide accountability for local jurisdictions.

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All right, great. Hello, everyone. I am going to talk about urban planning in California and I'm presenting a data tool that has all of California city and county comprehensive plans these are giant documents hundreds of pages long, and we have enabled you to do rapid text analysis for policy, making and advising, and this is research that's supported by the California air resources board and the California governor's office right now. So, for data nerds, there's, as you probably

know, fair standards and and data access one is that the data needs to be easily findable with rich metadata and a unique identifier like a DOI plans don't have that in California. So, plans are governing zoning density where streets are laid redevelopment and these documents are largely unstructured, they're very difficult to find on municipal websites. And there's no standard, standard format for them, and they're not hosted anywhere so this this is a huge problem in that planning wasn't adhering to fair standards so we decided to create a plan search engine. And then, where we're going with this is automating plan evaluation so we can see which California jurisdictions are planning for particular topics we care about, and I'll show you an example of that with environmental justice. So this is the search engine that we developed and this was first developed with as a student hackathon about five years ago so like Debby, we've been chewing on this for a very long time. This is what the interface looks like you can type in a single Boolean search term or phrase and it'll give you a hit for all counties and cities in California.

This database also allows us to track where plans are up to date and frustratingly even though the comprehensive plans are required to be updated every three to five years there are many jurisdictions that are not up to date so this allows advocates who care about moving the needle on planning to

push for plan updates. So, let me ask you all just for fun.

How many plans you can put it in the chat. Do you think, talk about mountain lions.

So just add it to the chat.

One. All right, five. All right, nothing higher. Zero. Are you ready to be shocked.

37 cities mentioned mountain lions so everything is in plans and eight counties address this this topic. All right now let me ask you, how many cities and counties in California, do you think,

mention the term golf so planning for golf courses, and I bring these two terms up because there's a whole host of planning documents that require jurisdictions to plan around climate, housing, habitat conservation.

Wow, we've got some skeptics in here, all of them.

Yes, so let's look at that 367 out of the 482 cities address golf nowhere they required to do this so this. This tool allows you to see what communities value and care about under planning for. There's a new push, because of local efforts in California to address environmental justice and this is the notion that disadvantaged community should not be burdened with new development that is going to further disadvantage them so think of things like citing waste infrastructure or building a bunch of new housing that displaces folks so this environmental justice concept was picked up by the state it is now mandated that every jurisdiction that has a disadvantaged community address environmental justice so let me ask you all how many cities

and counties in California. Do you think, use the term environmental justice, just drop it in the chat.

Two. All right. 50. All right, got some good engagement there.

Well this is definitely going to blow your mind look at this 120 out of the 482 cities are already addressing environmental justice. So this is work that we did with the California Environmental Justice Alliance. And they were really interested in creating technical support for jurisdictions to help them plan to address environmental justice, and they wanted to track progress for the state. So you can see, you can, we will continue to update the plans that are newly adopted and then continue to track progress and you can read more about it in this publication with Jenny Wagner at Sac State where we pull out exactly how communities are planning for environmental justice. So not only does the interface have this map where you can quickly summarize which jurisdictions are planning and then use that for space for their spatial analysis, but the tool also includes a table where you can sort by the term counts, the year of the plan, the county so that you can sort for all cities within a county if you want to say, ask your jurisdiction to do something that every other city in the county is already doing. You can also view the PDF, and then you can extract the text for for text analysis, which I'll talk about in a moment, but just the really simple piece, you can access all the PDF so you can look at the policy in place.

We talked about how we created this tool, and this environment and planning citation down here so if you're interested in more and how we work together with community environmental justice groups across California to build this tool to ground truth that our advice for other states that might want to follow California's example because right now, California is the only state with a tool like this that allows these hard fought over community plans to be aggregated visualized and assessed.

So, again, these these tools allow us to see where plans are out of date, what topics they have, and then to do some fancy footwork around spatial analysis of term mentions. So I'm going to talk a little bit about how we're thinking about automating some parts of plan evaluation now. And there's just, there's so many tools right now with chat gbt and other large language models that allow us to not just pull out single terms, which is a very high fidelity way of looking at what's in a plan based on the actual terms in the plan, but to aggregate words together and then look for topics. So this is the premise behind large language models. I have on my faculty website.

Some of the word association networks and you can play around with them. So if you're interested in more you can follow that link. So you can see that where words are correlated and where words are correlated we call that a topic so this core correlation of air ozone particular matter. If you were a planner you'd say, they're planning for air quality.

And then you can visualize these topics and see where terms are clustering together. So this is work that I did with Carl steamer at UC Davis in the library.

And we, what I'm showing you here are the topics within plans within all California city plan so all that text.

And then we, we looked at which topics were in those texts identified 60 topics and what I'm showing you right now are the topics that mentioned the term housing so you can see this big cluster of housing topics.

And the other thing that's concerning about this is that while plans are talking about housing and affordable housing. On one hand, that language and those policies don't always interface with other topics. So, these little peanuts I'm trying to California is so tricky to visualize city data because, because the cities are clustered and into geographic areas

and so I tried to make these bubble maps, but California looks like a weird peanut and so if you have ideas around that, since we're all spatial nerds here I'm happy to hear them. But what I'll point out here.

And housing topic 12 you can see which jurisdictions are planning largely for single family residential, and then you can correlate that with, are they planning for multifamily also or is it just mainly single family so this is a lot in the area of San Diego at the bottom there. And then when we look at if you remember those housing topics were to the right, we can see emissions are in a totally separate area of the plan so plans are talking about climate and greenhouse gas emissions and they're not always having the same conversation about housing and climate together which is a problem for policymakers so this is something that we're, we're taking back to the state.

We were also able to use topic models to pull out individual policies so for this paper with Jenny Wagner, we looked at which plans have the best topic fit for planning around environmental justice, and we use topic modeling because there are some jurisdictions that plan for environmental justice, but don't call it that they'll call it health equity for example.

And in the topic modeling you can capture all of the affiliated terms. And in just seven of the 482 cities just seven that have the best topic fit for environmental justice we identified 628 individual policies.

This is work that the California Environmental Justice Alliance was able to take and use as they as they create technical assistance documentation as they reflect back up to the state, what are some power local jurisdictions planning and how should the state consider planning based on what what local local areas are doing. And then it also allows researchers like us to do some fancy footwork around how are jurisdictions planning for people versus how they're planning for place. How are we doing restrictive justice or representational justice so all of these, these ideas around how we should be achieving climate justice, and whether we are getting there or not.

I'll just end by noting that the American Planning Association California chapter awarded us the academic excellence honor.

Last year, which is really wonderful so it shows that planners really value this which makes sense as they're drafting plans, analyzing plans as we're thinking about which local policies are bolding the state to take further action.

And then the the two scholars that you see here one is Kim Geboza who's a planner in the Inland Empire now, but was a graduate student working with me and Anaket Vangamore who is our lead software developer.

So with that I'll stop, and I'm happy to take questions.

Thank you so much, Catherine, I think that is also another incredible resource. This has been a really great panel.

It looks like our fourth speaker is unable to attend today, so we're going to move right into our question time. I'm going to scroll back up to the top to make sure I don't miss anything.

Q&A

And Catherine asks of blue kids, this is very your presentation is very interesting given the hype around young people and liberals moving from blue to red counties ahead of the election, will you add voting patterns to your analysis.

It's going to be at some point in the future but it's definitely not something we've considered so far, we're trying to just to focus more on like COVID and enrollment and kind of factors that go into those into enrollment.

And along those lines and Pasha asks if you've considered breaking down your units of analyses to something smaller, maybe like census tracts as opposed to just counties.

We actually have done that so a lot of data is them like that, and we've done a lot of other statistical analysis the main one though that we've presented was the T test we've done regression models and stuff like that as well.

Well we've considered census tracts and we've also done analysis on like individual schools within accounting as well because some counties only have like two or three schools in them, so it's not as counting, not all counties are equal.

And we have some good discussion going on about these work and if she's planning on uploading this to as res living Atlas, it looks like they're looking into that. And Natasha's got a question for Catherine, do your maps inform legislators legislators and communities and or other decision makers, have you had any look at moving the needle. Yeah, um, great question I'd say we're working right now with the governor's office of land use and climate initiatives and with the California air resources board so state agencies are really interested. I think now's a tricky time for federally.

But we're working, we're having conversations with other states, because we made our code available on GitHub so that we can other states could take what we've done gather their plans

and then do the do the same thing and then it's been really heartening to see the needle move on environmental justice I don't know that we've moved the needle so much as all of the grassroots environmentalists have moved the needle on that, but we get to help them celebrate it and amplify that to the state.

Thank you. And I was wondering if you wanted to expand on the question you responded to in the chat from Alexander as to if local environmental risk plays a role in a city's planning and if the city is more at risk of environmental hazard, we'd see a correlation with the efficacy of their plan. That is a great, great question there are so many great questions around how we govern place that we haven't asked to I have to tell you all.

There was a meta analysis of plan evaluations completed about 10 years ago by Phil Burke, and he showed over a 20 year period something like 20 ish plan evaluations, that's it. So we have not done enough plan evaluations we're not looking at what's happening, and we're not correlating that with implementation.

We could do so much more so there's just there's so much room for folks to jump in and our hope was that by opening this treasure chest, assembling it and opening it, we welcome everyone to ask and answer questions like that.

Thank you, and can shot asks if you know if there's something like your tool for school board plans and policies. What are you thinking of in China.

Like, if, for instance, if your school board school district. The school board is actually like trying to pass some bill or bill but like their own type of rule or policy. If there's any way to like compile those and see look for trends that are happening like across the state or in a certain area.

No, I haven't seen anything like that.

Because I've been so focused on city and county level and state level plans I haven't actually delved into what school board plans look like how their form added or where they might be catch but that's, that would be really fascinating. I know for the little city I live in Davis, the school districts budget is twice the city's budget so school districts are in, you know, they can be big players and in place making.

So that, that's a great idea.

Definitely. I agree with that. Do other folks have questions for our speakers today, and for you to also raise your hand if you would like to speak.

Well, if we have no further questions. I know we have some contact information available. Look each other up if you have further questions that come to mind after we end.

And this is also our last session of you see GIS week. I want to say thank you to everyone who has participated presented attended both those who have helped us manage you see GIS week.

We can't do you see GIS week without all of the great work, y'all are doing all over the state. It's been really inspiring to see what's going on in so many different areas of the field, and to just see how much great work is being done by our colleagues. And I just want to say I'm so impressed with what everybody's doing. I've learned so much this week. And I'm sure I'm not the only one. So thank you all again thank you to Amy work for sharing our planning committee, not do it without our fearless leader I think Amy could run the Navy if she wanted to she's that good.

The rest of our organizing team as well.

We've had a really great time and we hope to see you again for you see GIS week 2025.