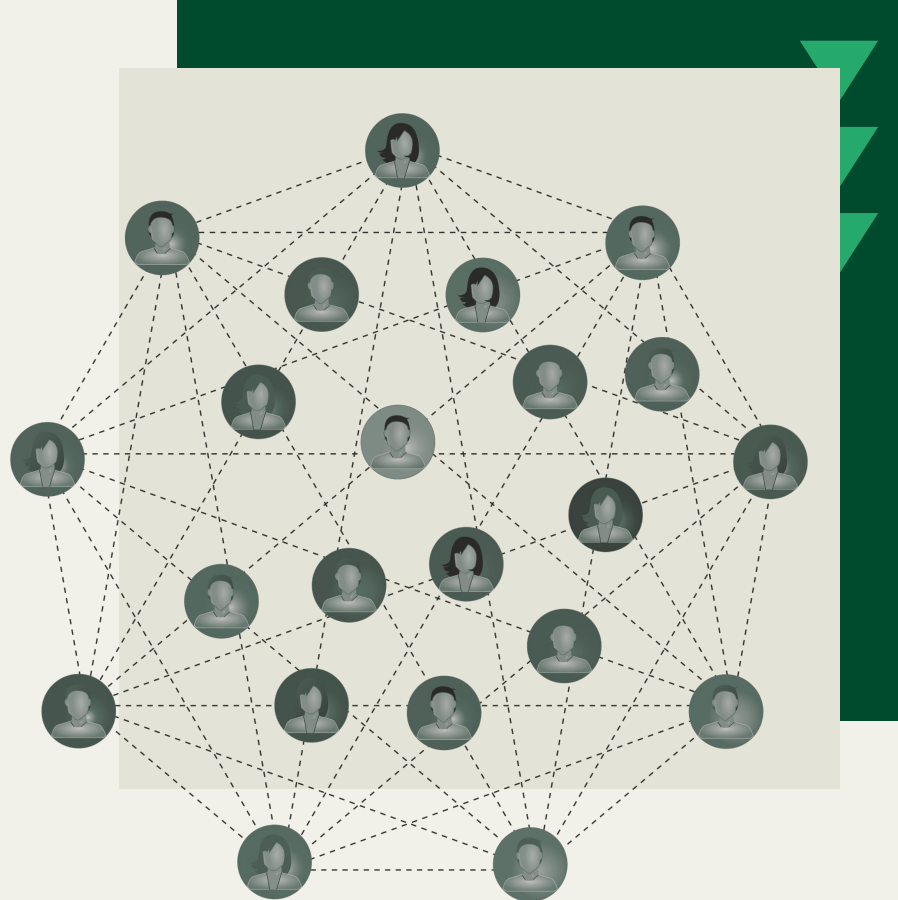


School Board Meeting Transcript **Problem Solution Capability**

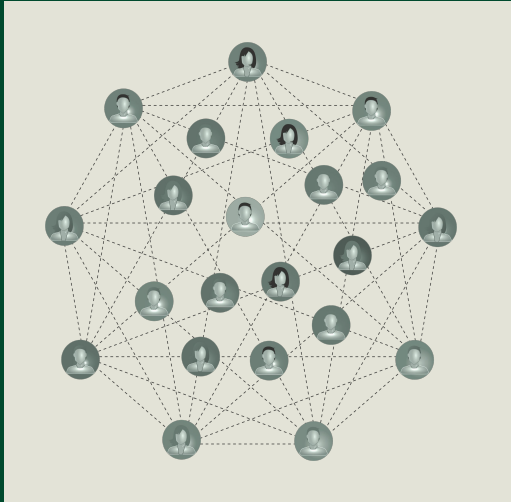


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Capability



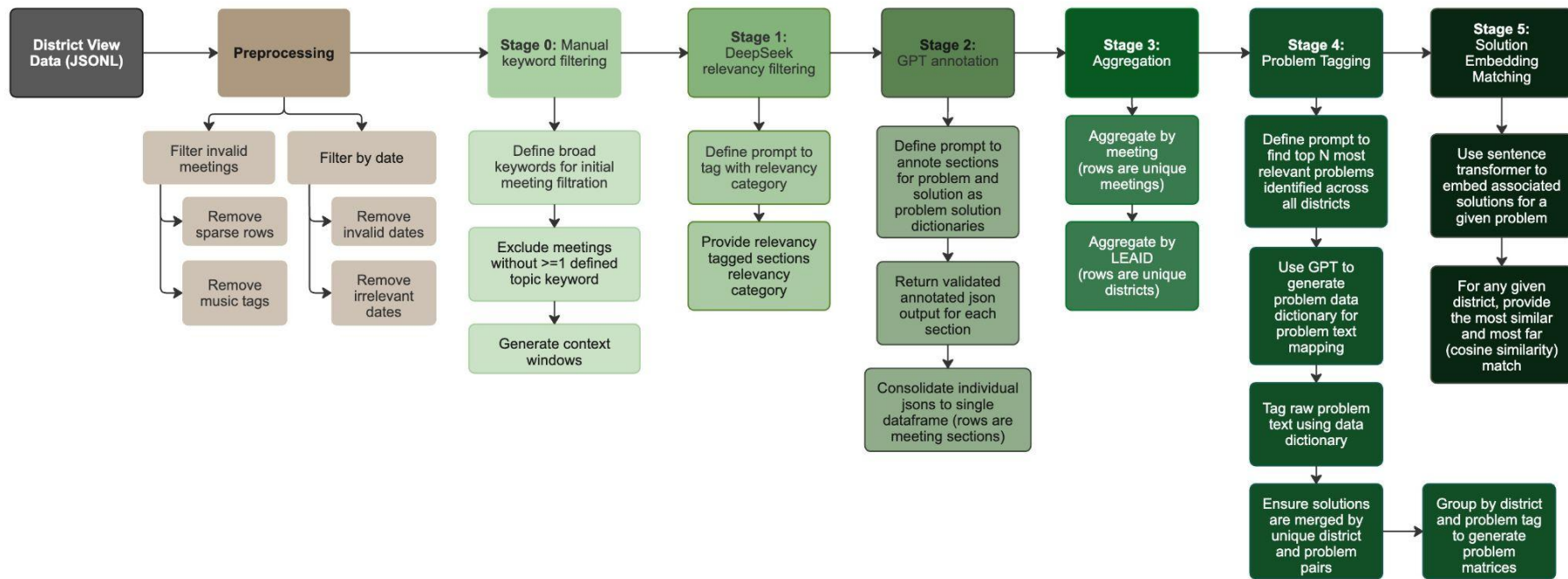
■ What is it?

Pipeline proof of concept to provide networking capability through problem-solution and district grouping

- Problem solution data mining using LLM based approach
- Find top N most relevant problems across all districts pertaining to a user specified topic
- Dynamically construct problem datasets for most relevant problems for district solution matching and comparison
- Identify district problems potentially in need of solutions



Workflow



School Closures Example

Topic	"School closures"
Data	District View
Dates	2024-2025
Top N relevant problems	N = 6

Pipeline Input

- Deepseek relevancy tagged transcript sections

Pipeline Output

- Aggregated Data
- Problem Data Dictionary
- Tagged Data
- Problem Solution Dataset

Problem solution prompt

“ Below is a list of problems identified from school board meetings across different districts related to {topic}. The problems may be phrased differently, but could refer to the same underlying subject matter. Your task is to group such similar problems together, identify the top {n} most discussed problem themes, and to return a dictionary where keys are taglines summarizing the top {n} themes with their associated values being descriptive but concise summaries of each respective problem topic. The dictionary will be used in the future for categorization and tagging of district problem statements, therefore it is important to focus on semantic and topic similarity rather than exact wording.

IMPORTANT: (1) Do not include any text, explanations, or preambles outside the comma separated problem topic output.

(2) Only use double quotes around keys and values of the dictionary. (3) Do not wrap your response in `` `json or `` ` markdown code blocks.

###PROBLEM LIST: {problems_list}

###OUTPUT FORMAT: {{"string": "string", "string": "string", ... }} ” *(using GPT4.1)*



Pipeline Output: Aggregated Data

view meeting dataframe:

	video_id	leaid	problem_solution_dictionary
0	-uQwG7aDRn8	5103240	{'School consolidation cannot be implemented i...
1	019bEg34Ocs	612120	{'Difficulty retaining quality coaches for ath...
2	028ZucUjcFE	636800	{'Closure of James Monroe Middle School leadin...
3	0SwFGXnr4sg	3603840	{'Adding additional school closure holidays wi...
4	0mil-QvH3aM	3701800	{'Long bus rides and increased transportation ...
...
194	y_xtrqFio4I	691024	{'Confusion and concern regarding the classifi...
195	yslJwsO9UB4	3411880	{'Sixth grade students facing disruption by be...
196	zCi50vxmH2E	900450	{'Community perception that school closures me...
197	zUrnjR2K-U4	633840	{'Low enrollment in the Parent Participation P...
198	zp5SH2IeOIA	1201680	{'Lack of widespread communication about schoo...

199 rows x 3 columns

Meeting Aggregated

view district dataframe:

	leaid	problem_solution_dictionary
0	100240	{'Declining school enrollment making it financ...
1	102820	{'Aging school facilities built as early as th...
2	200180	{'Current school buildings are undersized and ...
3	401460	{'Lack of public awareness about programs and ...
4	403040	{'Need to reduce staffing due to budget constr...
...
129	5103840	{'Loss of in-person instructional time for stu...
130	5303750	{'Overcrowding in existing high schools due to...
131	5307770	{'Rising complexity and cost of special educat...
132	5400330	{'Unsafe and hostile school environment due to...
133	5400660	{'Risk of legal proceedings and court challeng...

134 rows x 2 columns

District Aggregated



Pipeline Output: Aggregated Data

view meeting dataframe:

	video_id	leaid	problem_solution_dictionary
0	-uQwG7aDRn8	5103240	{'School consolidation cannot be implemented i...
1	019bEg34Ocs	612120	{'Difficulty retaining quality coaches for ath...
2	028ZucUjcFE	636800	{'Closure of James Monroe Middle School lea...
3	0SwFGXnr4sg	3603840	{'Adding additional school closure holidays
4	0mil-QvH3aM	3701800	{'Long bus rides and increased transportat

view district dataframe:

	leaid	problem_solution_dictionary
0	100240	{'Declining school enrollment making it financ...
1	102820	{'Aging school facilities built as early as th...

Aggregated by merging
problem solution
dictionaries

310 relevant topic sections
containing problem solution
represented by **199** board
meetings

134 districts represented
by the 199 board
meetings

198	zp5SH2leOIA	1201680	{'Lack of widespread communication about schoo...
-----	-------------	---------	---

199 rows 3 columns

133	5400660	{'Risk of legal proceedings and court challeng...
-----	---------	---

134 rows 2 columns

Meeting Aggregated

District Aggregated

Pipeline Output: What does a single problem solution dictionary look like at this point?

<div>0100240{'Declining school enrollment making it financ...</div>	
Keys (problems)	Values (solution list)
Declining school enrollment making it financially unsustainable to keep the school open	<ul style="list-style-type: none">• Hold a community meeting to explain situation and potential outcomes, including transportation logistics• Decide on the school's future by February to provide clarity for planning• Collect accurate data from families on their intentions regarding staying or leaving the school
Uncertainty about school closure leading to staff anxiety and potential resignations	<ul style="list-style-type: none">• Commit to a clear decision timeline (by February) to reduce uncertainty for staff and allow for planning• Communicate regularly with staff about the status and process to keep them informed
Difficulties reaching families to gather input or update contact information	<ul style="list-style-type: none">• Immediately attempt to contact families whose information is outdated or unreachable to gather necessary feedback• Send out letters and other communications to maximize contact with families
Parental concerns and dissatisfaction with lack of communication and engagement	<ul style="list-style-type: none">• Host community meetings to hear and address parental concerns and questions• Explain the decision process transparently, including transportation and consolidation options
Potential conflict over assigned schools if closure occurs (e.g., parents desiring one school, children assigned to another)	<ul style="list-style-type: none">• Collect preference data from families on desired school placements to better inform assignment decisions if consolidation is necessary• Review and potentially reconsider placement decisions based on updated family input



Pipeline Output: Top N Most Relevant Problems Data Dictionary

N = 6

Declining Enrollment and Financial Pressures	Chronic declines in student enrollment are leading to underutilized schools, inefficient budgeting, and significant financial deficits . Districts are forced to consider school closures, staff reductions, program cuts, and consolidation to achieve fiscal stability, but face long-term uncertainty about enrollment trends, revenue streams, and state funding.
Community Trust, Engagement, and Communication Gaps	There is widespread dissatisfaction over insufficient transparency, rushed or top-down decision-making, and minimal stakeholder engagement in school closure processes. Community members, parents, and staff report lack of timely information, poor communication, exclusion from planning, and loss of trust in district leadership regarding closure decisions.
Operational and Logistical Challenges	School closures and consolidations create complex logistical problems including student and staff reassignment, transportation issues, boundary adjustments, capacity mismatches, and disruption of specialized programs . These transitions often result in overcrowding, underutilized buildings, and strained support services, causing stress and confusion for affected families.
Loss of School and Community Identity	Closing or merging schools disrupts community ties, erodes local identity and traditions, and undermines the sense of belonging among students, families, and staff. Emotional distress, resistance, and division arise as cherished school cultures, staff relationships, and unique programs are lost or spread thin during repurposing.
Facilities and Infrastructure Issues	Aging, inadequate, or unevenly utilized school buildings pose major challenges for districts. Decisions about closures are complicated by facility disrepair, high maintenance and renovation costs, outdated infrastructure, capacity imbalances, and difficulties with building repurposing or sale, all of which strain resources and planning efforts.
Equity, Access, and Student Well-being	School closures and consolidations risk deepening inequities—disproportionately impacting vulnerable, special needs, and marginalized student populations . Concerns include disruption to academic and extracurricular opportunities, loss of support services, increased travel burdens, inconsistent program access, and negative effects on student safety, social-emotional health, and learning outcomes.

Problem tagging prompt

“ You are given a data dictionary related to {topic} concerns that defines a set of problem categories, each with a corresponding description. Your task is to assign the INPUT string describing a problem to the most appropriate category based on these descriptions.

Data Dictionary (categories and descriptions): {ps_dictionary}

Instructions:

1. Carefully read the descriptions of all categories.
2. Analyze the input string's content to determine the underlying meaning or intent.
3. Match the string to the single best-fitting category based on the descriptions.
4. If the input does not clearly match any category, return "other".
5. Return only the matched key from the data dictionary or "other" if no match is appropriate.
6. Do not include any text, explanations, or preambles outside the category string.

INPUT: {input} ”
(using GPT4.1)



Pipeline Output: Tagged Data (example run for first 5 districts)

	leaid		problem_tag	solutions_list
0	100240		Declining Enrollment and Financial Pressures	[Hold a community meeting to explain situation...
1	100240		Operational and Logistical Challenges	[Commit to a clear decision timeline (by Febru...
2	100240	Community Trust, Engagement, and Communication...		[Immediately attempt to contact families whose...
3	100240	Community Trust, Engagement, and Communication...		[Host community meetings to hear and address p...
4	100240		Operational and Logistical Challenges	[Collect preference data from families on desi...
...
99	200180		Facilities and Infrastructure Issues	[Encourage partnerships and shared use of scho...
100	401460	Community Trust, Engagement, and Communication...		[Increase public relations efforts to inform t...
101	401460		Operational and Logistical Challenges	[Participate in external studies (such as thos...
102	403040		Declining Enrollment and Financial Pressures	[Offer staff whose positions are being elimina...
103	403040	Community Trust, Engagement, and Communication...		[Clearly communicate that there are currently ...

104 rows x 3 columns

```
# check tagging of unrelated strings
get_problem_tag(prob_str = 'children having arguments over bring your pet to school day',
                 ps_dictionary = PS_DICTIONARY)

'other'
```

1

Tag original problem strings with problem dictionary, “other” is used to denote problems not captured by the problem dictionary

2

Consolidate problem solutions for each district (groupby LEAID + tag). combine solutions lists for the same problems within the same district

	leaid		problem_tag	solutions_list
0	100240	Community and Stakeholder Engagement		[Initiate immediate contact with parents using...
1	100240		Declining Enrollment Challenges	[Hold a community meeting to explain transport...
2	100240	Emotional and Social Impact on Students		[Utilize a virtual model for alternative educa...
3	100240		Financial and Resource Management	[Cut expenses by possibly closing and consolid...
4	100240	Transportation and Logistics Concerns		[Provide transportation solutions for students...
5	102820	Community and Stakeholder Engagement		[Explore the option of building a new high sch...
6	102820		Financial and Resource Management	[Upgrade all buildings at one time to keep the...
7	200180	Community and Stakeholder Engagement		[Consider repurposing schools to serve broader...
8	200180		Declining Enrollment Challenges	[Relocate schools to larger facilities such as...
9	200180	Emotional and Social Impact on Students		[Engage with parents and students to discuss a...

Pipeline Output: Problem Matrices (example run for first 5 districts)

	leaid	problem_tag	solutions_list
0	100240	Community Trust, Engagement, and Communication...	[Immediately attempt to contact families whose...
5	102820	Community Trust, Engagement, and Communication...	[Evaluate the option to consolidate into a cou...
7	200180	Community Trust, Engagement, and Communication...	[Repurpose Lakehood Elementary to host the Ala...
13	401460	Community Trust, Engagement, and Communication...	[Increase public relations efforts to inform t...
15	403040	Community Trust, Engagement, and Communication...	[Clearly communicate that there are currently ...
	leaid	problem_tag	solutions_list
1	100240	Declining Enrollment and Financial Pressures	[Hold a community meeting to explain situation...
8	200180	Declining Enrollment and Financial Pressures	[Undertake a more decisive and thorough school...
16	403040	Declining Enrollment and Financial Pressures	[Offer staff whose positions are being elimina...
	leaid	problem_tag	solutions_list
2	100240	Equity, Access, and Student Well-being	[Utilize virtual models for alternative educat...
9	200180	Equity, Access, and Student Well-being	[Move schools to facilities with more amenitie...

3

Group problems. Get data frames for each

	leaid	problem_tag	solutions_list
3	100240	Facilities and Infrastructure Issues	[Initiate a study to analyze restructuring and...
6	102820	Facilities and Infrastructure Issues	[Upgrade all existing buildings at once to mai...
10	200180	Facilities and Infrastructure Issues	[Relocate schools to larger facilities such as...
	leaid	problem_tag	solutions_list
11	200180	Loss of School and Community Identity	[Acknowledge community attachment and communic...
	leaid	problem_tag	solutions_list
4	100240	Operational and Logistical Challenges	[Commit to a clear decision timeline (by Febru...
12	200180	Operational and Logistical Challenges	[]
14	401460	Operational and Logistical Challenges	[Participate in external studies (such as thos...

	leaid	problem_tag	solutions_list	solution_vector
0	100240	Community Trust, Engagement, and Communication...	[Immediately attempt to contact families whose...	[-0.048148032, -0.0023705806, -0.008320522, 0...
5	102820	Community Trust, Engagement, and Communication...	[Evaluate the option to consolidate into a cou...	[0.033149727, 0.00085573376, 0.003192712, -0.0...
7	200180	Community Trust, Engagement, and Communication...	[Repurpose Lakehood Elementary to host the Ala...	[0.048340492, 0.03703676, 0.061118014, 0.01270...
13	401460	Community Trust, Engagement, and Communication...	[Increase public relations efforts to inform t...	[0.06605582, 0.042160112, 0.02326334, 0.083427...
15	403040	Community Trust, Engagement, and Communication...	[Clearly communicate that there are currently ...	[0.00076033734, 0.0535602, 0.066159666, -0.023...
	leaid	problem_tag	solutions_list	solution_vector
1	100240	Declining Enrollment and Financial Pressures	[Hold a community meeting to explain situation...	[0.010563095, 0.03262001, 0.017562669, 0.04958...
8	200180	Declining Enrollment and Financial Pressures	[Undertake a more decisive and thorough school...	[-0.0030002426, 0.04815885, 0.014455389, 0.013...
16	403040	Declining Enrollment and Financial Pressures	[Offer staff whose positions are being elimina...	[0.0005764182, 0.022385405, 0.06465017, -0.017...
	leaid	problem_tag	solutions_list	solution_vector
2	100240	Equity, Access, and Student Well-being	[Utilize virtual models for alternative educat...	[0.05835192, 0.0018674199, -0.004798067, -0.01...
9	200180	Equity, Access, and Student Well-being	[Move schools to facilities with more amenitie...	[0.08798582, 0.065915786, 0.023248062, 0.07475...

4

	leaid	problem_tag	solutions_list	solution_vector
3	100240	Facilities and Infrastructure Issues	[Initiate a study to analyze restructuring and...	[0.0866819, -0.0026515482, 0.0015345068, 0.005...
6	102820	Facilities and Infrastructure Issues	[Upgrade all existing buildings at once to mai...	[0.050551027, -0.019706633, 0.03848069, 0.0105...
10	200180	Facilities and Infrastructure Issues	[Relocate schools to larger facilities such as...	[0.03779352, -0.01450275, -0.0151320435, 0.046...
	leaid	problem_tag	solutions_list	solution_vector
11	200180	Loss of School and Community Identity	[Acknowledge community attachment and communic...	[0.030090367, -0.007437655, -0.01289911, 0.055...
	leaid	problem_tag	solutions_list	solution_vector
4	100240	Operational and Logistical Challenges	[Commit to a clear decision timeline (by Febru...	[0.032607045, 0.020533582, 0.010362838, 0.0209...
12	200180	Operational and Logistical Challenges	[]	NO_SOLUTIONS
14	401460	Operational and Logistical Challenges	[Participate in external studies (such as thos...	[0.04538574, -0.034476675, -0.0022843862, 0.07...

Get solution vectors

Pipeline Output: Problem Matrices (example run for first 50 districts)

5

Match with districts with most similar and least similar solutions for the given problem. Provide place name and lead information

which_problem	this_district_lead	this_district_place	this_district_state	this_district_solution	closest_lead	closest_place	closest_state	closest_solution
Community Trust, Engagement, and Communication...	628650	Orange Unified sb	California	[Establish ongoing touch points and updates du...	800260	NaN	Colorado	[Pre-announce recommendations to all affected ...
Community Trust, Engagement, and Communication...	901710	Greenwich School District sb	Connecticut	[Notify aquatics parents and community stakeho...	612120	NaN	California	[Establish a transparent and consistent commun...
Declining Enrollment and Financial Pressures	612120	NaN	California	[Consider implementing programs to grow revenu...	602310	Alum Rock Union Elementary sb	California	[Reduce special education expenditures by \$1.9...
Declining Enrollment and Financial Pressures	901020	Danbury School District sb	Connecticut	[Plan for how to recoup funding and adjust for...	612120	NaN	California	[Consider implementing programs to grow revenu...
Equity, Access, and Student Well-being	618390	Inglewood Unified sb	California	[Maintain and expand existing special programs...	636800	Sierra Sands Unified sb	California	[Establish an independent study school featuri...
Equity, Access, and Student Well-being	806160	Pueblo County School District 70 sb	Colorado	[Keep the middle school open to maintain a dev...	1201590	Polk sb	Florida	[Consider using specific buildings as transitio...
Facilities and Infrastructure Issues	1601800	Lakeland District sb	Idaho	[Evaluate the cost-benefit of investing in rep...	901710	Greenwich School District sb	Connecticut	[Provide reasoning and documentation for why r...
Facilities and Infrastructure Issues	634800	San Luis Coastal Unified sb	California	[Consider extending the school property lease ...	511970	Rogers School District sb	Arkansas	[Remove all district-needed items such as text...
Loss of School and Community Identity	1201260	Marion sb	Florida	[Engage stakeholders in exploring ways to reco...	806160	Pueblo County School District 70 sb	Colorado	[Retain local schools to reinforce community s...
Loss of School and Community Identity	636800	Sierra Sands Unified sb	California	[Lead with student voice by facilitating focus...	629490	Pajaro Valley Unified sb	California	[Involve current staff in designing the new pr...
Operational and Logistical Challenges	608460	Chino Valley Unified sb	California	[Explore strategies to mitigate instructional ...	629940	Pasadena Unified sb	California	[Prioritize continuity and routine for student...
Operational and Logistical Challenges	900450	Bridgeport School District sb	Connecticut	[Implement a careful and strategic redistricti...	640740	Vallejo City Unified sb	California	[Evaluate proximity of schools to each other t...

Problem	District	This Solution	Closest Match	Closest Solution	Farthest Match	Farthest Match
Community Trust, Engagement, & Communication Gaps	628650 (Orange Unified sb)	['Establish ongoing touch points and updates during the decision-making process so everyone knows what's happening', 'Allow public and community members to provide input and demonstrate that the process is thoughtful and involves their concerns', 'Work through a committee to collaboratively complete the process rather than making unilateral decisions']	800260 (Colorado)	['Pre-announce recommendations to all affected communities with sufficient lead time before board decisions', 'Hold community and staff meetings, both in-person and virtual, for engagement and feedback', 'Provide opportunities for public comment prior to final decisions']	627060 (Newark Unified sb)	['Implement long-term hiring practices focused on staff retention', 'Develop support and incentive programs to keep teachers for multiple years']
	618390 (Inglewood Unified sb)	['Maintain and expand existing special programs and student pathways at remaining schools']	636800 (Sierra Sands Unified sb)	['Establish an independent study school featuring a middle college pathway', 'Apply for and utilize grants to support alternative educational programs', 'Develop soft skills curriculum to support student empowerment and success regardless of household background']	600021 (Sunol Glen Unified sb)	['Reconfigure main office and share workspace arrangements to ensure staff can access confidential space for sessions']
Loss of School & Community Identity	636800 (Sierra Sands Unified sb)	['Lead with student voice by facilitating focus groups to define core values, school vision, and mission statement', 'Engage students, staff, and the community in visioning and mission-setting processes', 'Use professional development days to gather input and build alignment with staff before community rollout']	629490 (Pajaro Valley Unified sb)	['Involve current staff in designing the new program to retain successful elements of the existing model', 'Facilitate listening sessions to ensure staff expertise informs new approaches']	629940 (Pasadena Unified sb)	['Refrain from merging IB coordinators into a single coordinator position to maintain accreditation', 'Rescind pink slips given to IB teachers to retain staff and preserve program integrity']

See sample_district_matching.csv

Files

1 `step0_data_prep_and_relevancy_filtering.ipynb`

- Loads district view data, cleans data and removes invalid entries
 - Performs first pass keyword filtration and generate context windows
 - Defines relevancy tagging prompt and use DeepSeek model to tag context window sections
-

2 `step1_problem_solution_gpt_annotation.ipynb`

- Loads relevant sections from step0 tagging, filters to desired dates & removes NaT/ invalid dates
 - Analyzes each transcript section, defines problem solution prompt and uses ChatGPT 4.1 model
 - Load and validates problem solution LLM response as JSON
-

3 `step2_problem_solution_data_prep_and_aggregation.ipynb`

- Prepares and cleans annotated section data
 - Aggregates problem solution data by meeting and district
 - Defines prompt for and builds problem data dictionary with GPT4.1
 - Uses problem data dictionary to map problem tags to each problem texts
-

4 `step3_ps_matching.ipynb`

- Cleans problem tags,
 - Constructs problem matrices by consolidating district-problem groups
 - Generates semantics oriented embeddings for solutions, used in problem solution matching
 - Identifies district problems which have no current solutions
-

Next steps and ideas:

Merge with demographic data.
Visualize connections. Create
networking opportunities. Perform
problem solution specific EDA.
Build out capability with UI...

