

DATASCI 210: Capstone Project Proposal

UC Berkeley, School of Information

Idea I am proposing: *Arc Radius: AI-Powered Resource & Policy Hub for LGBTQ+ Youth*

Link to prototype: <https://ambroquach29.github.io/spring26-mids-capstone>

Author: Ambro Quach

Background and Skills:

- CS Undergrad @ UCSD
- SWE @ Shell Green Energy (previously)
- Art and Design background
- Full-stack SWEs and DevOps (Python/TypeScript, NodeJS/Langchain, Postgres/MongoDB/GraphQL, AWS, Docker, Kubernetes)
- Machine learning at scale (PySpark, distributed systems)
- Built Legal ML models using LegalBERT, TF-IDF and NLP applications
- Interests: Algorithmic fairness, bias detection frameworks, privacy by design
- Passion for projects integrating AI applications with social impact and ethical safeguards
- Relevant classes: 231: behind the data: humans and values, 255: ML systems engineering, 261: ML at scale

Problem Statement:

LGBTQ+ youth in the United States face a mental health crisis of unprecedented proportions. According to The Trevor Project's 2024 National Survey of over 18,000 LGBTQ+ young people ages 13-24:

- **39%** seriously considered suicide in the past year (46% among transgender/nonbinary youth)
- **12%** attempted suicide in the past year
- **84%** desired mental health care, but **50%** were unable to access it
- **90%** reported negative well-being impacts from recent anti-LGBTQ+ politics
- **60%** experienced discrimination based on sexual orientation or gender identity
- **Only 28%** of youth mental health facilities offer LGBTQ-specific services

At the same time, the legislative landscape has become increasingly hostile. In 2024 alone, over 530 proposed bills aimed to curtail LGBTQ+ youth rights, including healthcare access, bathroom usage, and educational opportunities. The Movement Advancement Project tracks 375+ active anti-LGBTQ bills across 43+ states as of early 2025.

The core problem: LGBTQ+ youth lack a unified, intelligent platform that combines local resource discovery with real-time policy awareness and crisis support connections. Current solutions are scattered across multiple apps, websites, and organizations, creating barriers during moments when quick access to affirming resources can be life-saving.

Impact

Why This Problem Is Important to Solve:

- **Life-Saving Potential:** Research shows that LGBTQ+ youth who lived in very accepting communities had significantly lower suicide attempt rates. Connecting youth to affirming spaces and resources directly addresses the leading cause of death among this population.
- **Information Gap:** 45% of transgender and nonbinary youth reported their families have considered moving states due to anti-LGBTQ+ policies. These families need accessible, accurate information about laws and protections in different jurisdictions.

- **Healthcare Access Crisis:** 50% of LGBTQ+ youth who wanted mental health care couldn't access it. Cost, parental permission requirements, and geography are major barriers that can be addressed through better resource discovery.
- **Rapidly Changing Legal Landscape:** With hundreds of bills introduced annually affecting LGBTQ+ rights, static information sources become outdated quickly. An AI-powered system can track and synthesize legislative changes in real-time.

Market Size:

- **Target Population:** Approximately 9.5% of US youth ages 13-17 identify as LGBTQ+ (~3 million individuals). Including young adults 18-24 expands this to an estimated 5-7 million individuals.
- **Mental Health Services Market:** The US mental health apps market is valued at over \$5 billion and growing at 15%+ CAGR. LGBTQ+-specific solutions represent an underserved segment.
- **Social Care Technology:** The social determinants of health (SDoH) technology market is expanding rapidly, with platforms like Findhelp valued in the hundreds of millions.
- **Stakeholder Interest:** Healthcare systems, schools, nonprofits, NGOs/CSOs, and government agencies are actively seeking solutions to address LGBTQ+ youth mental health disparities.

Market Landscape / Competitive Analysis:

Company	Stage	Product Overview	Customer	Gap vs. Arc Radius
Everywhere Is Queer	Startup	Directory of 20K+ queer-owned businesses; 250K+ downloads since Feb 2024	LGBTQ+ adults seeking businesses	No healthcare/services focus; no policy tracking; not youth-specific

QLIST	Startup	Global LGBTQ+ venue guide with 6K+ locations; crowd-sourced	LGBTQ+ travelers	Nightlife/travel focus; no healthcare, policy, or crisis support
Voda	Startup	AI mental health companion with queer-led meditations and journaling	LGBTQ+ adults seeking wellness	Self-help only; no resource locator or policy tracking
Trevor Project	Nonprofit	Crisis hotline, chat, text; TrevorSpace community for ages 13-24	LGBTQ+ youth in crisis	Crisis-focused; no local resource discovery or policy info (integration partner)
Findhelp	Enterprise	Largest US social care network; B2B platform for healthcare/govt	Healthcare systems, government	B2B only; not LGBTQ-specific; no direct consumer app (API partner)
Movement Advancement Project	Nonprofit	Tracks 50+ LGBTQ policies across all states; static maps and reports	Researchers, advocates, policymakers	Reference tool; no AI Q&A; no resource locator (data source)

Market Gap: No existing solution combines all three critical functions:

- (1) local LGBTQ+-affirming resource discovery
- (2) AI-powered legislative tracking and Q&A
- (3) Integrated crisis support connections. Arc Radius fills this gap by creating a unified platform that serves as a "single source of truth" for LGBTQ+ youth navigating their daily lives and the complex legal landscape affecting them

Relevant Research & Existing Literatures:

- The Trevor Project 2024 National Survey - thetrevorproject.org/survey-2024/
- LGBTQ+ Youth Policy and Mental Health (PMC 2024) - pmc.ncbi.nlm.nih.gov/articles/PMC11682966/

- Availability of LGBTQ Mental Health Services (JAMA Pediatrics 2023) - jamanetwork.com/journals/jamapediatrics/fullarticle/2805375
- MAP Equality Maps Policy Tracking - lgbtmap.org/equality-maps
- GLSEN School Climate Research - glsen.org/research
- Recruitment and Wellbeing of LGBTQ-Serving Providers (PMC 2024) - pmc.ncbi.nlm.nih.gov/articles/PMC10932474/
- Down but not defeated: Clinicians can harness the power of policy for LGBTQ+ rights (2023) - sciencedirect.com/science/article/pii/S0091743523000038
- Disclosure of Self-Injurious Thoughts and Behaviors Across Sexual and Gender Identities (2021) - publications.aap.org/pediatrics/article-abstract/148/4/e2021050255/181280/Disclosure-of-Self-Injurious-Thoughts-and? redirectedFrom=fulltext
- Trans Teens Await an Uncertain Future (2020) - nytimes.com/2022/01/18/health/transgender-adolescents-arkansas.html
- HIV Policy Lab: United States Data - hivpolicylab.org/us

Datasets:

Policy & Legislative Data (Heavyweight Champ)

- Movement Advancement Project (MAP) Equality Maps - CSV exports of 50+ LGBTQ+ policy categories by state; policy tally scores
 - Size: ~2,500 records, < 5MB
- LegiScan API - Real-time legislation tracking across all 50 states; bill text, status, sponsors, voting records
 - Size: ~120,000 bills per session (50 States + Congress), 2 GB to 15 GB+ (full bill text)
- GLSEN State Snapshots - State-specific research on school climate, policies affecting LGBTQ+ students
 - Size: ~1,200 – 5,000 survey respondents (biannual), 10 MB – 50 MB

Services & Resources Data (Yellow Pages)

- **SAMHSA National Survey of Mental Health Services** – Federal dataset of all US treatment facilities; filterable by LGBTQ+ services
 - **Size:** ~13,000 - 16,000 facilities, **5 MB - 25 MB**
- **Findhelp API** – Nation's largest social care network; searchable programs for food, housing, healthcare, transit
 - **Size:** ~970,000 program locations, 1000+ cities, **1 GB - 3 GB** (100 MB if filtered only for LGBTQ+ specific)
- **CenterLink Directory** – Verified directory of LGBTQ+ community centers nationwide
 - **Size:** ~375+ communities, **< 1 MB**

Crisis & Support Resources (Hotlines)

- **Trevor Project Resources** – Hotline, chat, text services; TrevorSpace community platform
- **Trans Lifeline** – Peer support hotline run by trans people
- **LGBT National Help Center** – Talklines and youth chatrooms
- **PFLAG Chapters** – Local support resources for LGBTQ+ youth and families

Data Science Techniques:

1. LegalBERT Classification

- Fine-tuned transformer classifies bills as Supportive/Neutral/Harmful; NER extracts key provisions; generates impact scores
- *Application:* Bill analysis cards showing risk level and plain-language summaries

2. Bill Passage Prediction

- XGBoost + Cox survival analysis predicts passage probability and timeline based on sponsor party, committee, and state legislative history
- *Application:* "Predictions" tab showing likelihood percentages and expected timeline

3. Bill Similarity Network

- BERT embeddings + cosine similarity detect "copycat" template bills spreading across state legislatures
- Application: "Similar Bills" section linking related legislation (e.g., TX SB14 → FL SB 254)

4. Cross-State Comparison

- Descriptive analysis comparing resource availability (per 100K) across states grouped by policy environment
- Note: Correlation, not causation—many factors influence resource availability
- Application: "What Similar States Look Like" panel with actionable next steps

5. Geospatial k-NN Search

- Haversine distance + R-tree indexing finds affirming resources within configurable radius
- Application: Resource Locator map with distance-sorted results

6. NLP Service Extraction

- Extracts services, accessibility info, and review summaries from resource data
- Application: Resource detail cards showing "Services Offered" and "Key Findings"

7. Health Info RAG (under consideration)

- Retrieval-augmented generation over clinical guidelines (WPATH, Endocrine Society, Fenway Health) and PubMed
- Application: Health Q&A with cited sources for PrEP, HRT, STI questions

8. Advocacy Letter Generation

- LLM drafts personalized support/oppose letters using bill analysis and research evidence
- Application: "Take Action" tab with one-click letter drafts and legislator contact info

Proposed Solution: Arc Radius

Arc Radius is an AI-powered mobile and web application that provides LGBTQ+ youth (ages 13-24) with a unified platform for discovering affirming local resources, understanding their legal rights, and connecting to crisis support.

Core Features

- **Resource Locator:** Location-based discovery of LGBTQ+-affirming healthcare providers, mental health services, community centers, restaurants, and other safe spaces within a configurable radius
- **Policy Navigator:** NLP-powered Q&A interface allowing users to ask questions about local laws and policies in plain language; real-time tracking of legislative changes with personalized alerts. Visualizations comparing state/city policy environments; trend analysis; actionable information on civic engagement opportunities
- **Crisis Connect:** Integrated connections to Trevor Project, Trans Lifeline, and other crisis resources; warm handoffs based on user needs assessment
- **Health Info Hub:** Plain-language health Q&A with cited sources from peer-reviewed literature and clinical guidelines (WPATH, Endocrine Society, Fenway Health). Designed for source resilience as federal LGBTQ+ health datasets face availability challenges.

Key Differentiators

- Youth-specific design and content moderation
- Unified platform combining resource discovery + policy intelligence + crisis support
- AI-powered natural language interface for complex legal information
- Real-time legislative tracking with personalized alerts
- Privacy-first architecture appropriate for vulnerable populations