CS761 Project Proposal: Investigating Disparities and Predictive Modeling in Organ Procurement

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1. Project Topic

My project will focus on organ procurement disparities, clinical predictors of organ viability, and regression models for procurement success. I will analyze the **Organ Retrieval and Collection of Health Information for Donation (ORCHID) dataset**, which is publicly available from PhysioNet and includes over **133,101 deceased donor referrals** across six **Organ Procurement Organizations (OPOs)** in the U.S.

2. Main Issues and Problems

My project attempts to address three primary issues:

1. **Disparities in Organ Procurement Outcomes** – Do race, socioeconomic status, and geography impact organ procurement rates?
2. **Influence of Clinical Variables on Procurement Success** – Which medical and laboratory parameters best predict procurement success?
3. **Regression Modeling for Organ Procurement Success** – Can regression models accurately predict whether an organ will be successfully procured?

These questions are crucial because organ transplantation relies on efficient allocation and procurement. Understanding disparities and improving predictive capabilities can help optimize transplant decisions and promote equity in the system.

3. Background Information Plan

To contextualize the research, I will review:

- **Existing literature on organ procurement disparities**, including racial and socioeconomic factors influencing donation rates.
- **Clinical criteria for organ viability**, focusing on blood chemistry, hematology, and arterial blood gas levels.
- **Current regression modeling approaches** in organ transplantation, particularly logistic regression and other statistical methods used in medical decision-making.
- **Policies and regulations governing OPOs**, to understand organizational influences on procurement outcomes.

Sources for my review will include academic journals, reports from the United Network for Organ Sharing (UNOS), and relevant medicaldecision-making studies.

4. Data and Variables

The ORCHID dataset contains **demographic, clinical, and procedure information on deceased donor referrals**. Specifically, the dataset includes:

- **Demographic Data**: Race, age, sex, geographic region, socioeconomic proxies (hospital identifier, OPO region).
- **Clinical Variables**: Blood chemistry, hematology, arterial blood gas levels, infection status, cause of death, comorbidities.
- **Referral and Procurement Details**: Referral source, organ type, authorization status, OPO performance metrics.
- **Outcome Variable**: Whether the organ was successfully procured.

This dataset can be obtained from PhysioNet: https://physionet.org/content/orchid/2.0.0/

5. Questions and Concerns

Questions:

1. What are the best statistical methods to adjust for confounding factors in organ procurement disparities?
2. How can missing data in clinical variables be handled to improve regression model accuracy?
3. What are the most effective regression techniques for predicting organ procurement success?

Concerns:

- **Class Imbalance**: Procurement success may be significantly rarer than failures, which could affect model validity.
- **Data Bias**: Referral processes and OPO performance may introduce biases into the dataset.