💡 Sleep Poverty Index

Predicting Cognitive Burnout Risk in Students Using Lifestyle Patterns

🧠 Domain Focus

Machine Learning + Cognitive Science + Student Wellbeing
A smart blend of technical ML skills and real-world psychological impact.

🎯 Project Objective

Build a predictive ML model to estimate the risk of **long-term mental fatigue (cognitive burnout)** among students, based on:

- Sleep patterns
- Device/screen usage
- Class load
- Stress & emotional indicators

🔄 Inspired by “sleep poverty” — a critical, under-researched cause of student burnout.

🌟 What Makes This Project Unique?

- ✅ Goes *beyond* traditional sleep trackers or academic stress predictors
- ✅ Based on **custom survey-based data** — not directly from Kaggle
- ✅ Targets *student mental health*, a deeply relevant & socially impactful area
- ✅ Adds **explainable ML** using tools like SHAP to show root causes
- ✅ Encourages empathy + innovation: *data for wellness*

📦 Key Input Features

- 💤 Average sleep hours over 30 days
- ⏰ Wake-up time consistency
- 📱 Night screen-time (esp. post-10 PM)
- 📚 Weekly assignment/class load
- 😓 Self-reported mood/stress level
- ☕ Caffeine or late-night stimulant usage
- 🏃‍♂️ Physical activity (steps or hours/week)

🧠 Modeling Goals

- 🔍 **Classification**:
  Risk Category → *Low / Moderate / High Burnout Risk*
- 📈 **Regression**:
  Predict *"Days until Expected Cognitive Burnout"*

- 📊 **Explainability**:
  Highlight *which lifestyle choices* contribute most to burnout risk

🔧 ML Tools Used

- 🤖 Scikit-learn — Classification/Regression models
- 🧠 SHAP or ELI5 — Feature impact explanation
- 📊 Matplotlib / Plotly — Visualize burnout timelines
- 🖥️ Streamlit — Build an interactive lifestyle-based prediction tool

🧪 Data Sources

- 📥 Start with these Kaggle datasets:
  1. *Student Sleep Patterns*
  2. *Stress & Sleep Patterns (Indian Students)*
  3. *Fatigue with FSS Dataset*
  4. *Student Stress & Performance*
  5. *Sleep Health & Lifestyle Dataset*
- ✍️ **Augment** with your own **Google Form survey**
- ✅ 100+ responses = enough for proof-of-concept and model building

🛠️ How to Make It Original

- 📌 Merge datasets & student survey inputs
- 🧪 Create a **custom "Burnout Risk Score"** combining sleep + stress + activity
- 🧠 Engineer features like:
  - *Sleep Debt* (Ideal - Actual Sleep)
  - *Stress per Study Hour Ratio*
  - *Post-10PM screen time*

🚀 Resume Hook (1-liner)

Built a novel explainable ML system that predicts student burnout risk using lifestyle and sleep data, helping visualize cognitive health trends and prevent fatigue.

🔮 Optional Future Expansion

- 📱 Burnout Alert System: *"You are 7 days from potential burnout — here's a recovery plan."*
- 📈 Weekly mood tracker for early detection
- ⌚ Integrate with wearables (Fitbit, Mi Band)
- 💼 Extend to corporate employees or night shift workers

✅ Why It's Resume Gold

- 🚀 *Completely novel*: No exact project like this exists publicly
- 🧠 *High relevance*: Solves a real mental health issue
- 🔍 *Explainable AI*: Transparency in prediction
- 🖥️ *Product mindset*: Data → ML → Visual UI
- ❤️ *Empathetic innovation*: Affects real student lives

- 📂 Strong candidate for **portfolio, interviews, or hackathons**

✅ Your Next Steps

1. Pick 1–2 Kaggle datasets
2. Create a simple Google Form for additional lifestyle inputs
3. Define “burnout risk” label based on FSS/stress scores
4. Train & tune models using Scikit-Learn
5. Use SHAP to interpret predictions
6. Deploy via Streamlit or Gradio (optional)

🎁 Bonus Tip:

📸 Add burnout risk charts, SHAP visualizations & UI mockups into your Canva PDF to show **end-to-end product thinking**!