



Campus
Guard AI



CampusGuard AI

Your AI-Powered Mental Health Guardian

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Overview



- Project Story
- Datasets Overview
- Data Preprocessing/ Feature Engineering
- Pipelines
- Machine Learning Models
- Demo
- Workflow
- Challenges
- Next Steps
- Conclusion



Project Story

- Student life balance stressful among students
- Burnout signs often missed
- Student mental health crisis on the rise
- Current support is only reactive, not enough



01

AI Study Copilot

Personalized Learning to help reduce workload

02

Stress & Burnout Predictor

Machine Learning analyzes Student lifestyle , stress and study patterns to predict burnout risk & stress levels : Low, Medium , High

03

Mental Health Journal

AI powered mood classification Health journal , with tips for self care





Datasets Overview

Two Pronged Approach

Validated Burnout Prediction

Source : Medical Student Burnout dataset from Figshare with 282 validated survey responses

Validation Framework

Maslach Burnout Inventory – Student Survey (MBI-SS) with proven reliability

Scientific Role

Provides a baseline for AI burnout classification ensuring the approach is grounded in established psychology

Proxy Stress Prediction

Source: Kaggle Student Stress Monitoring similar mental health datasets

Proxy Features

Sleep quality, workload, resilience, financial worries, study hours, stress scores

Practical Role

Enables real-world Stress prediction using lifestyle indicators

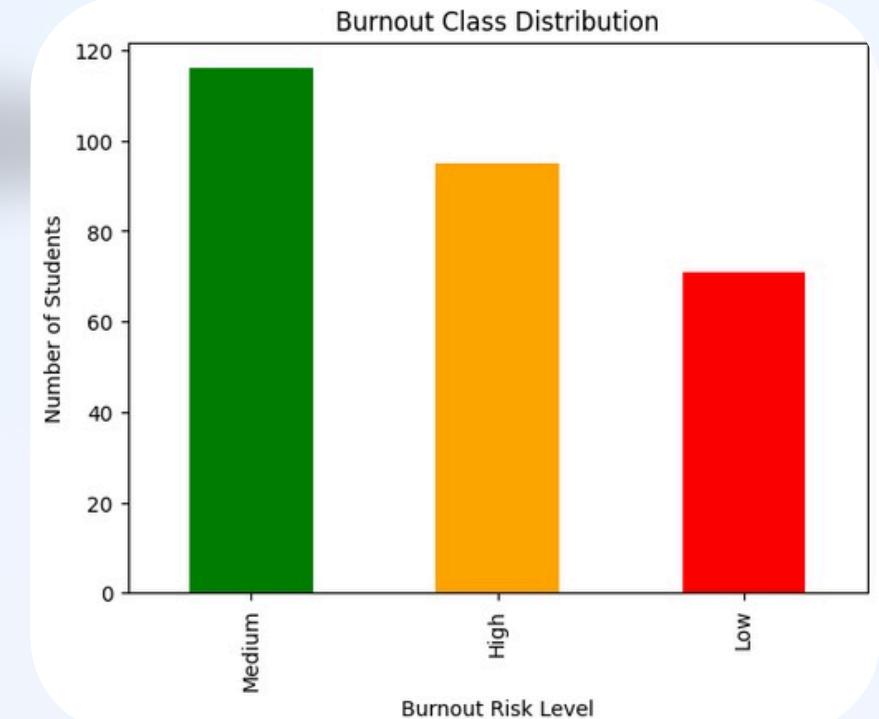
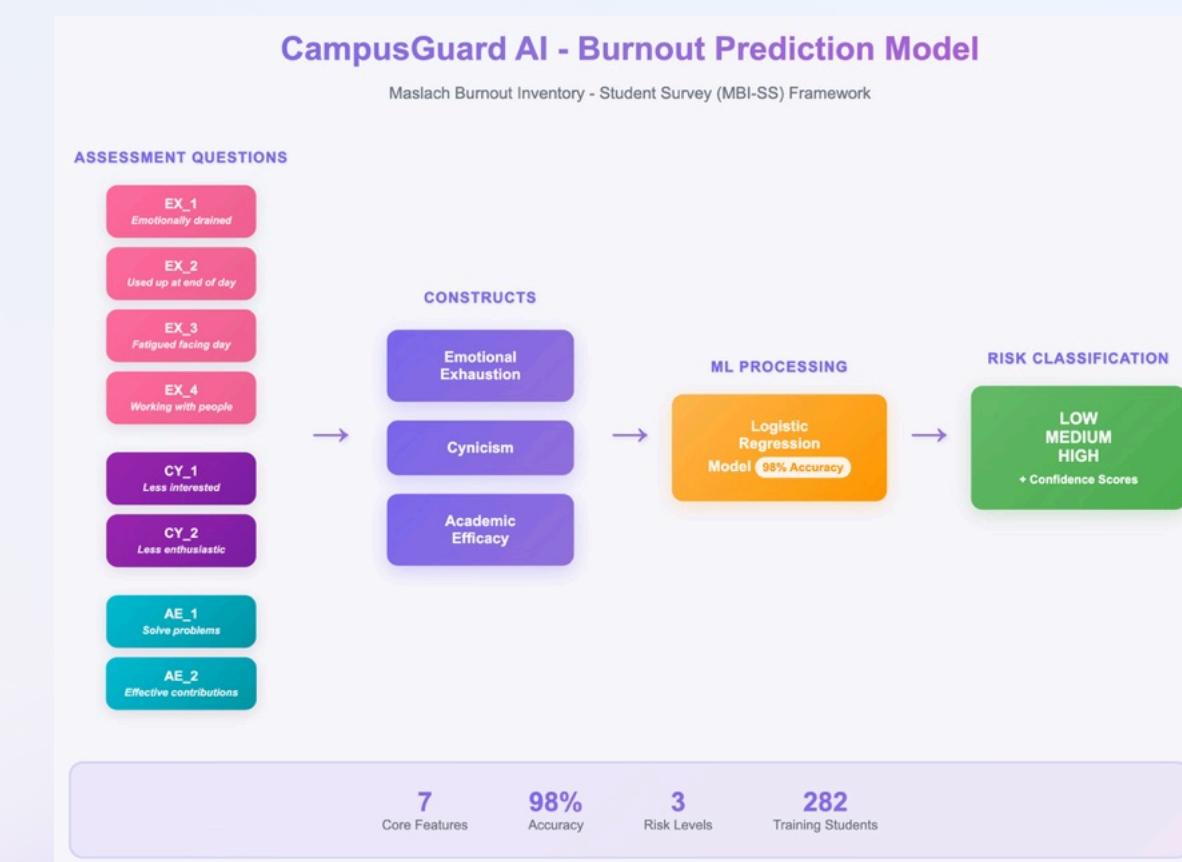




Data Preprocessing

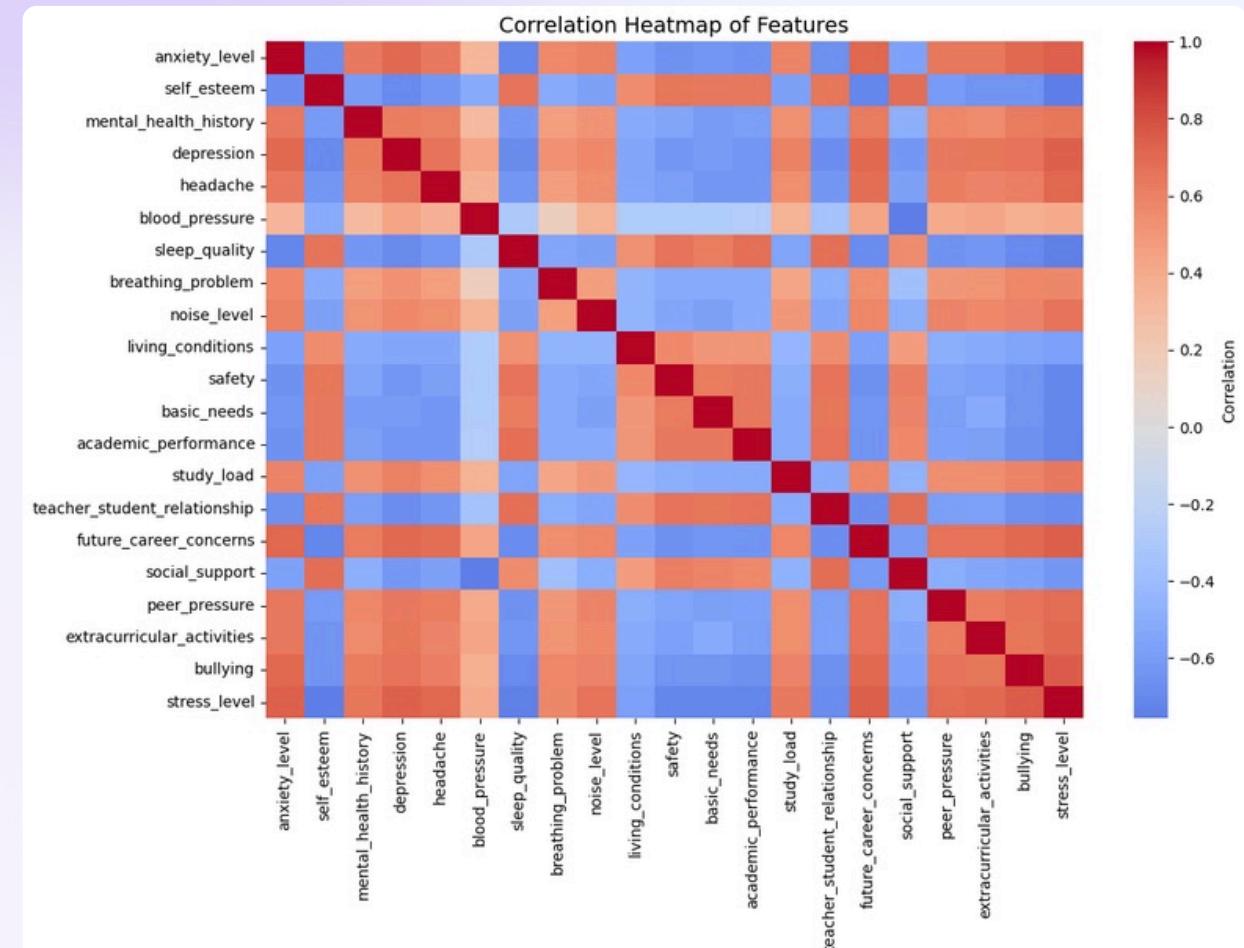
Medical Students Dataset

- 7 Features were selected from the MBI-SS Dataset Survey.
- Features here included questions about Exhaustion , Academic Efficacy & Cynicism
- Aggregated various questions relating to each feature
- Normalization of each feature to a 0-1 score and generated new burnout score column used for the classification with Logistic Regression



Kaggle Stress Dataset

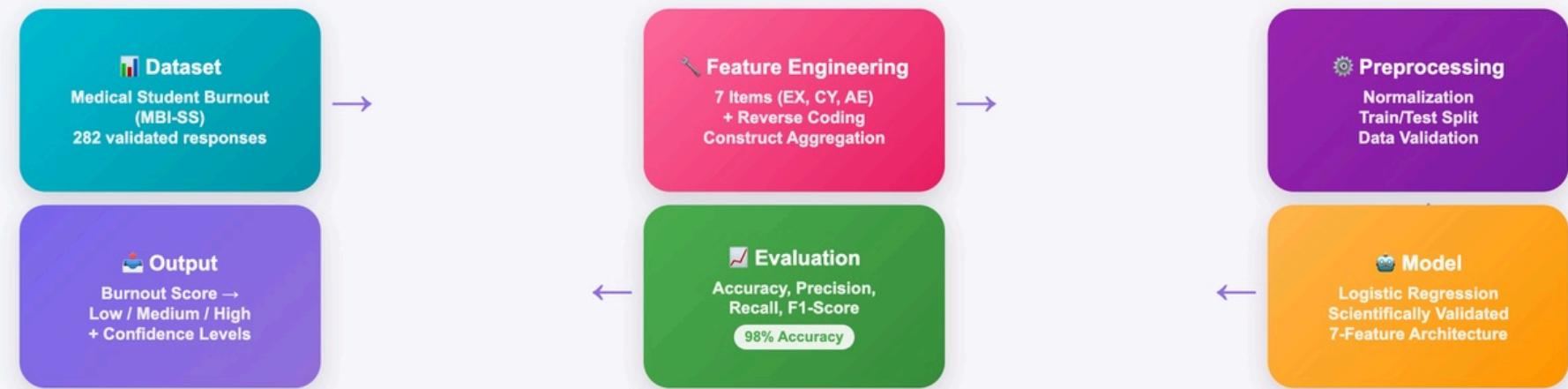
- Converted categorical answers into one hot vectors
- Continuous features like study hours were normalized to 0-1
- Correlation analysis helped filter out redundant features/ variables
- Focused on features with higher importance in the CatBoost model
- Correlation matrix insights : Stress doesn't arise from a single cause, emerges from a cocktail of domains ie,



Pipelines

CampusGuard AI - Direct Burnout Prediction Pipeline

MBI-SS Scientific Validation & Logistic Regression Model



282
Training Samples **7**
Core Features **98%**
Accuracy Score **MBI-SS**
Validation Framework

Logistic Regression Parameters

Direct Burnout Prediction Model Configuration

Parameter	Value / Setting	Description
Model Type	LogisticRegression	Linear classifier using MBI-SS validated psychological features
Penalty	L2 (Ridge)	Ridge regularization to prevent overfitting on small dataset
Solver	lbfgs	Optimal for small datasets (~282 samples) with L2 penalty
Max Iterations	1000	Ensures convergence for optimization algorithm
Random State	42 (fixed)	Ensures reproducible results across runs
Multi-class	auto	Handles 3-class problem (Low/Medium/High burnout)
Dataset Size	282 Medical Students	Small but high-quality validated psychological survey data
Feature Count	7 Core Features	MBI-SS subscales: Exhaustion (3) + Cynicism (2) + Academic Efficacy (2)
Train/Test Split	80/20 Stratified	Maintains class balance across Low/Medium/High burnout levels
Model Accuracy	98% Classification	High accuracy on validated MBI-SS psychological framework
Interpretability	Full Transparency	Linear coefficients provide clear feature importance insights

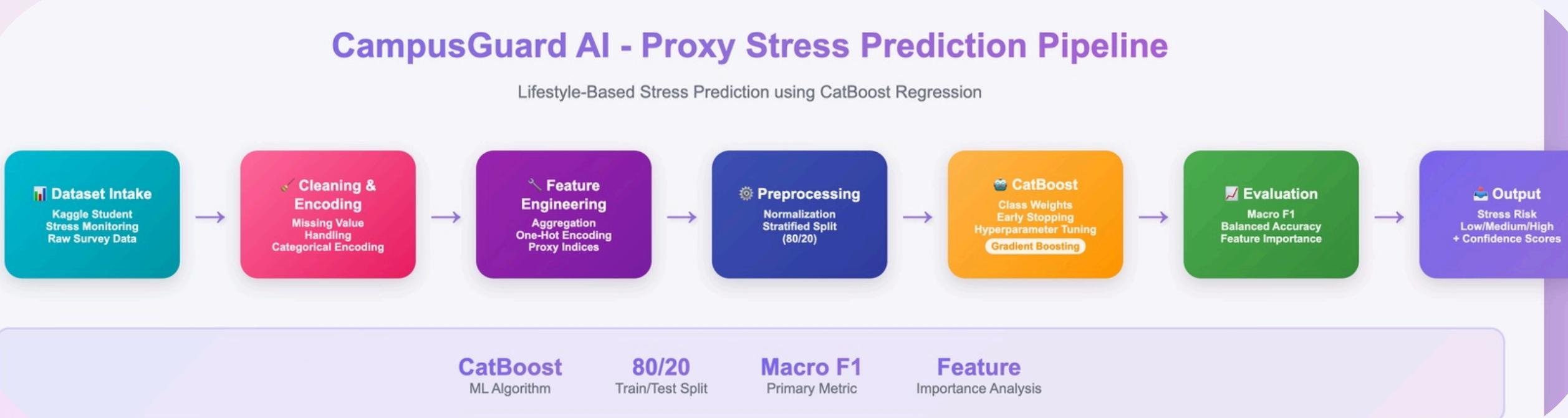
CatBoost Classifier Parameters

Proxy Stress Prediction Model Configuration

Parameter	Value / Setting	Description
Model Type	CatBoostClassifier	Gradient boosting classifier optimized for categorical features
Loss Function	Logloss	Multi-class handling built in
Iterations (n_estimators)	500–1000	Number of boosting iterations
Learning Rate	~0.05	Tuned for stability, avoids overfitting
Depth	6–8	Controls tree complexity
L2 Regularization	3 (default)	Kept to prevent overfitting
Class Weights	Enabled	Handles class imbalance between Low / Medium / High stress risk
Early Stopping	Patience: ~50 rounds	Stops training on validation set plateau
Random Seed	42 (fixed)	Ensures reproducibility
Evaluation Metrics	Macro F1 + Balanced Accuracy	Primary metrics for model performance assessment

CampusGuard AI - Proxy Stress Prediction Pipeline

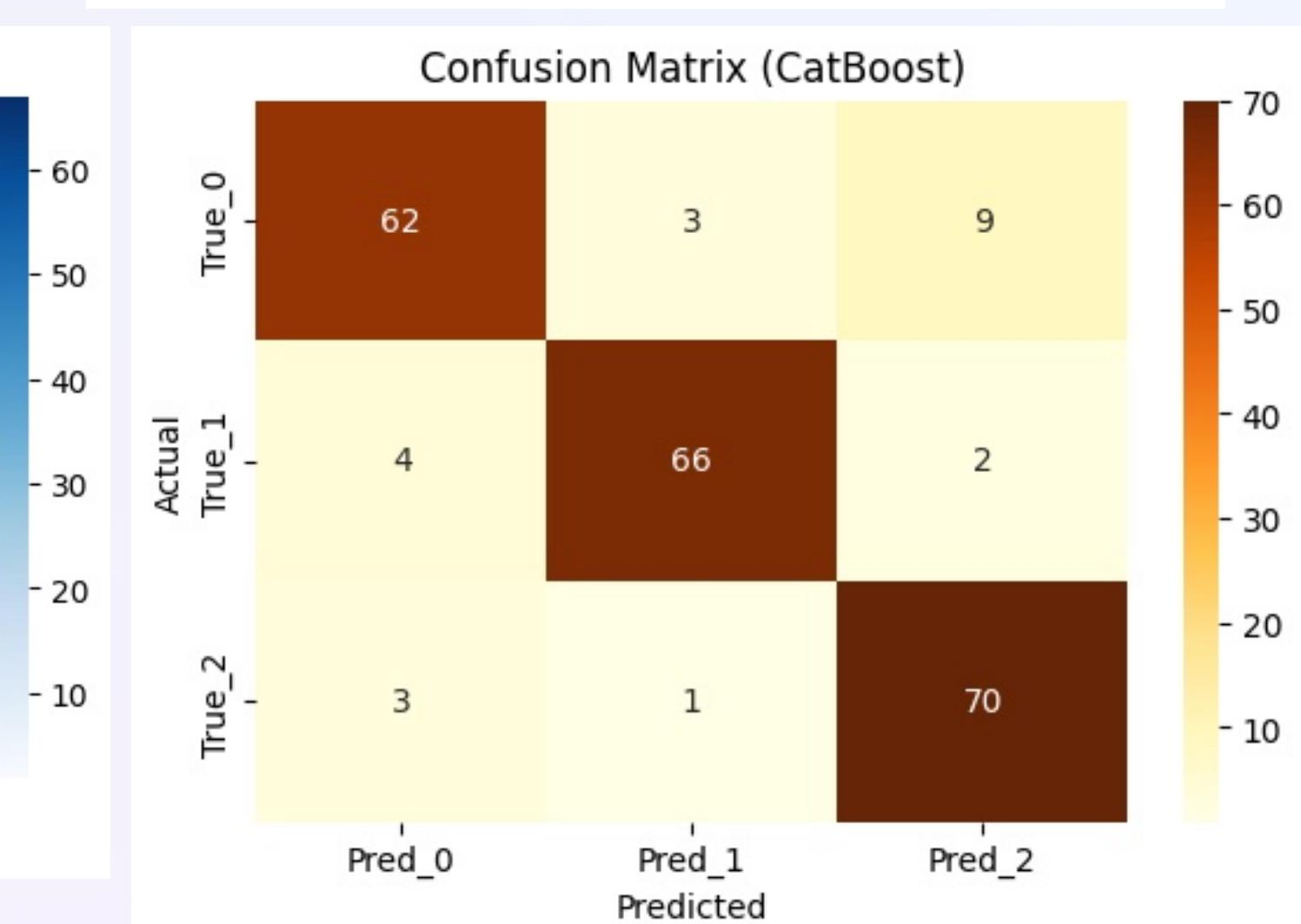
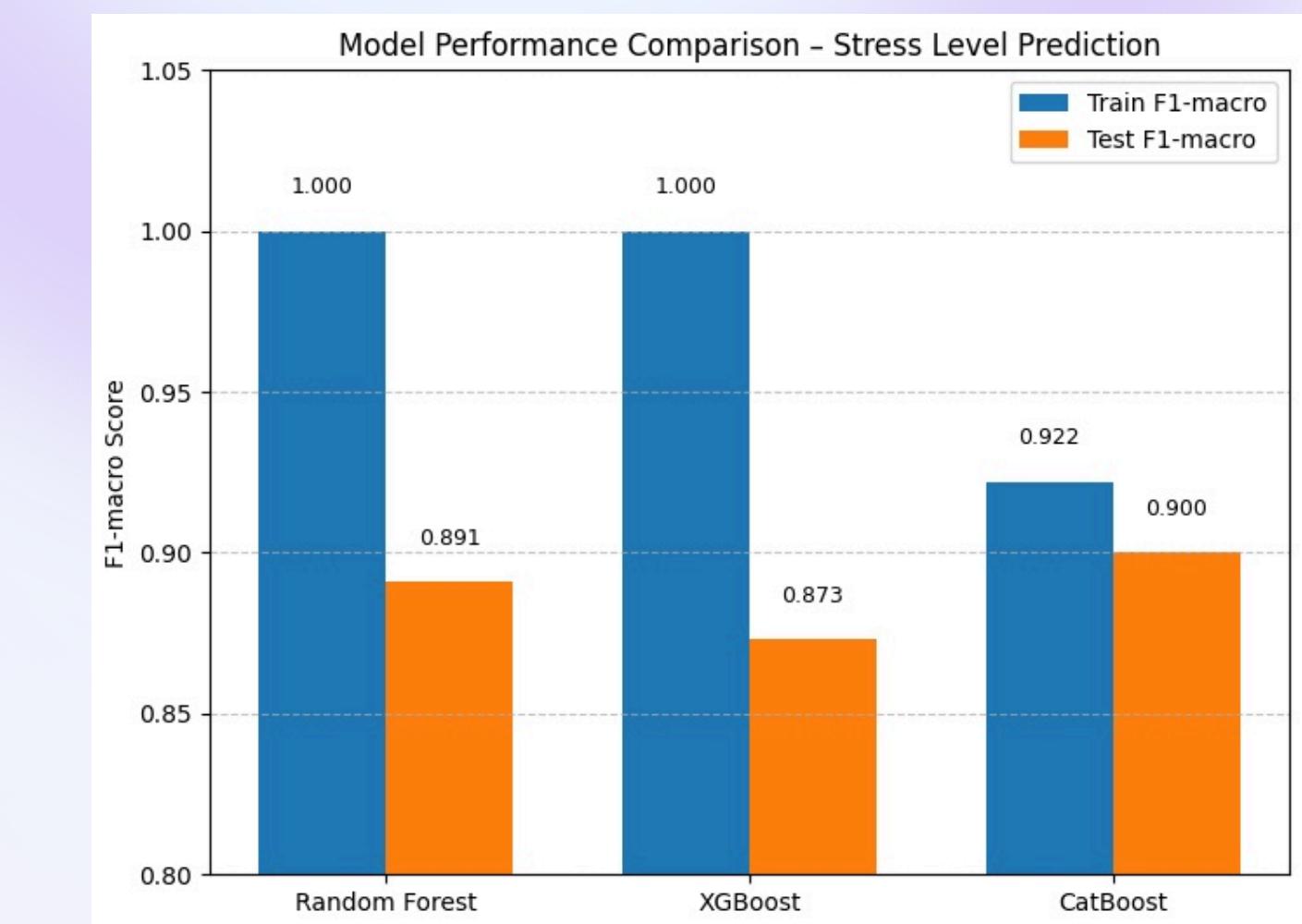
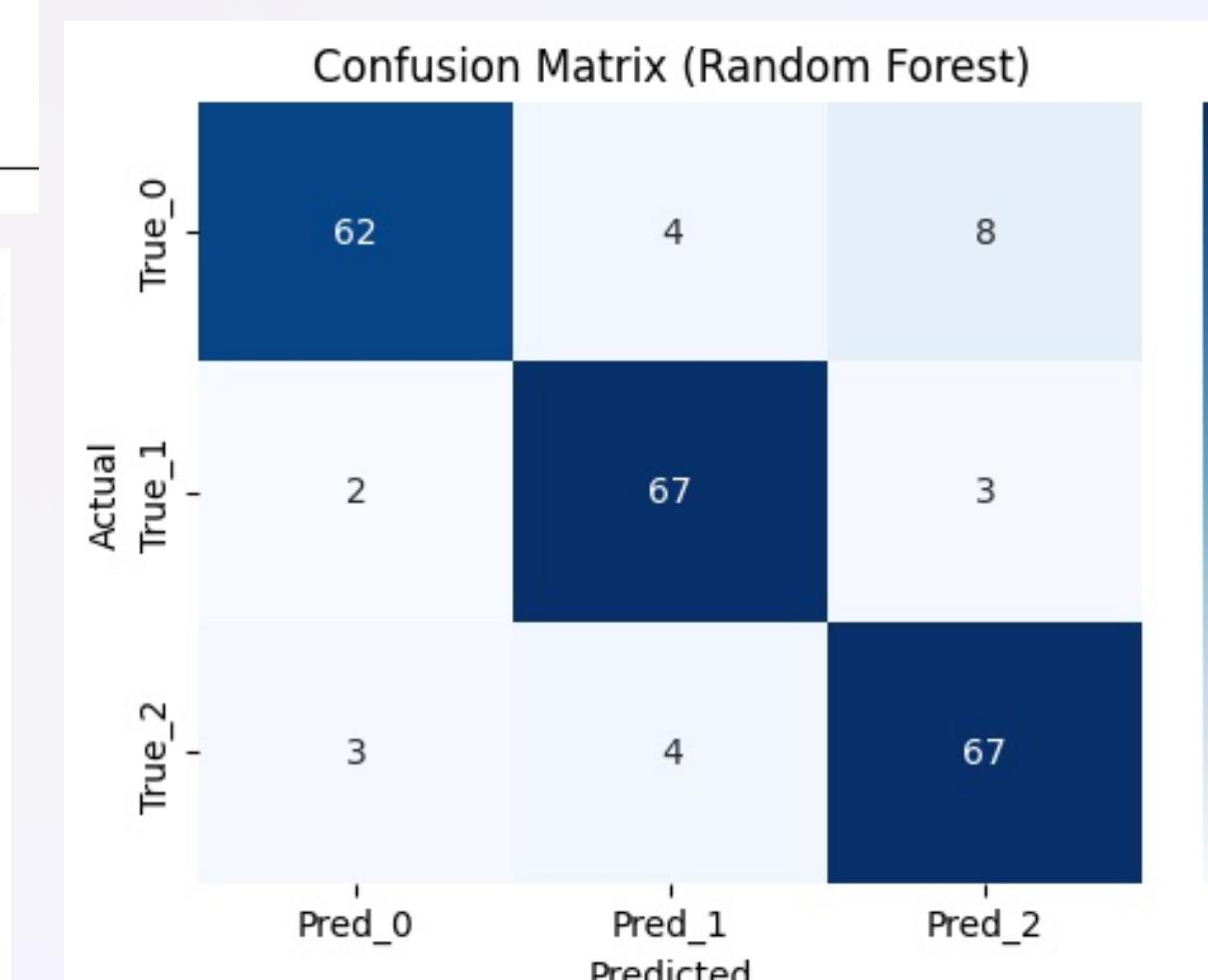
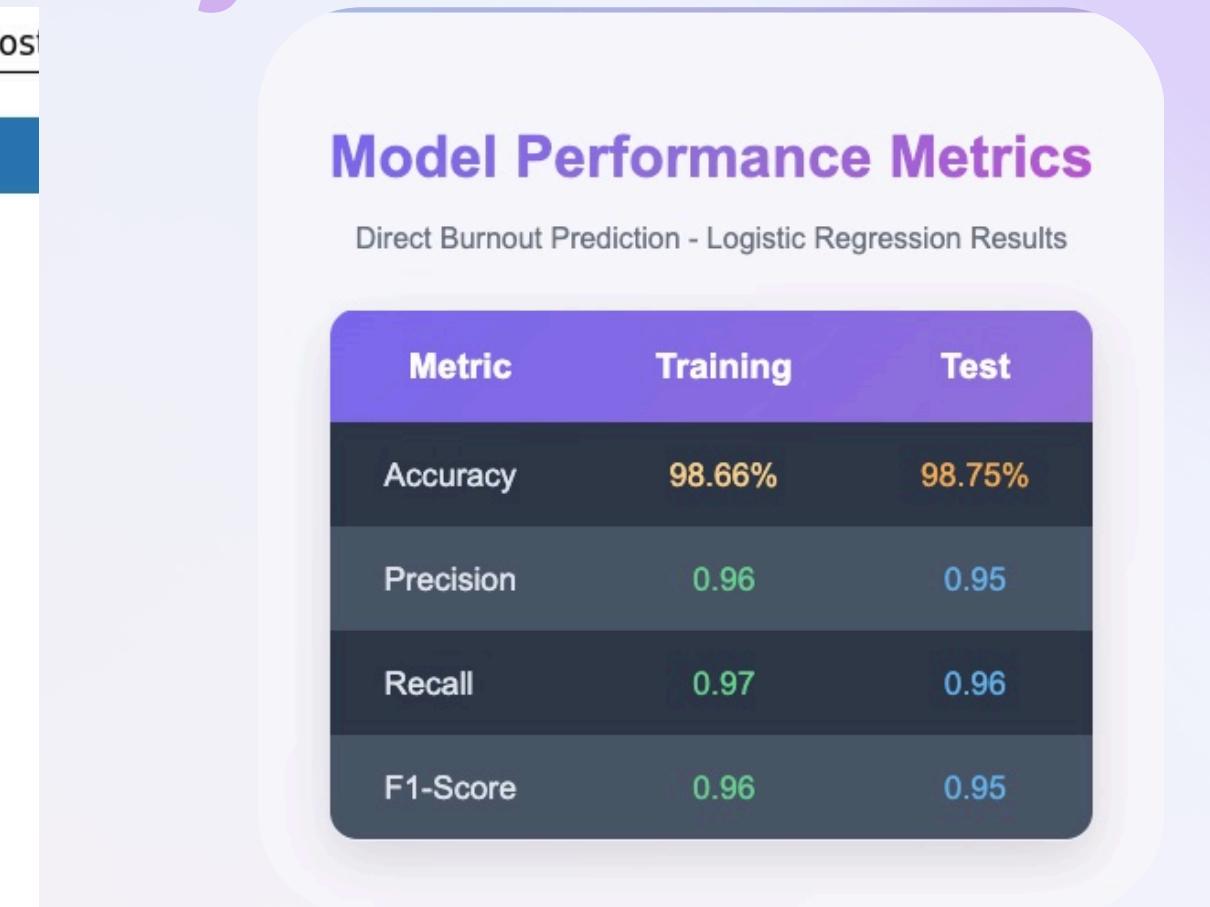
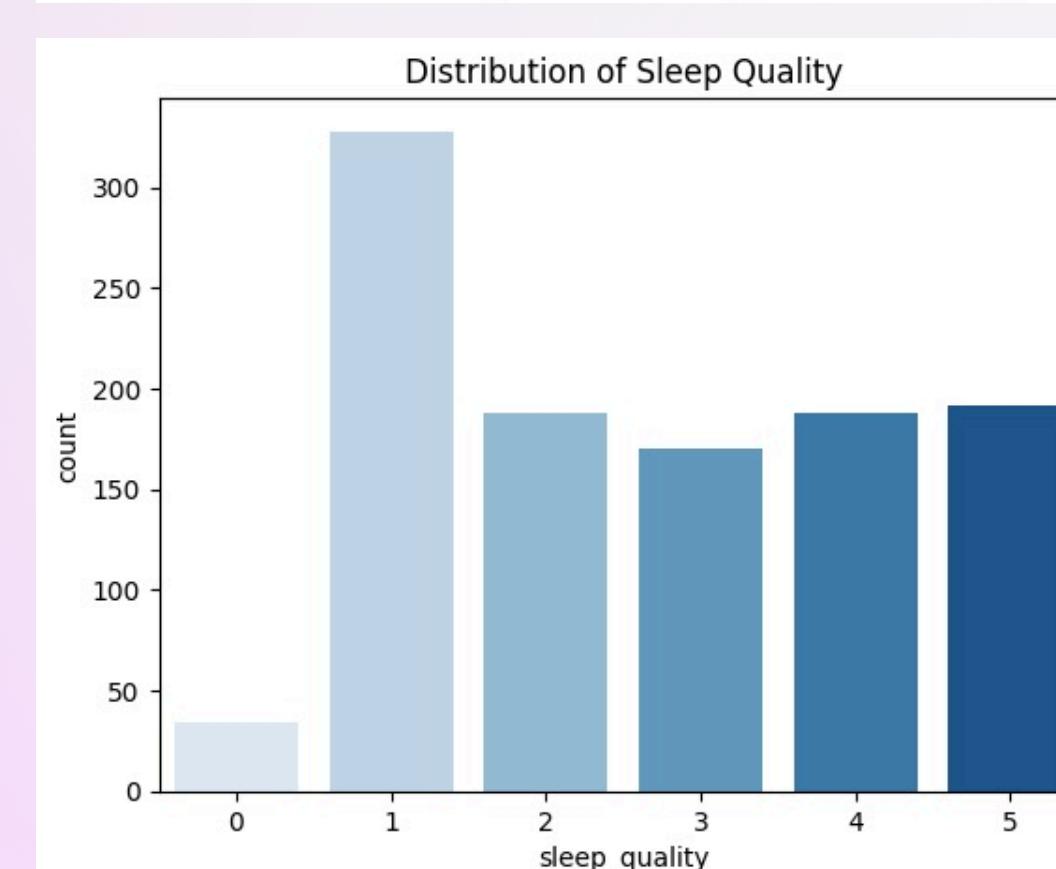
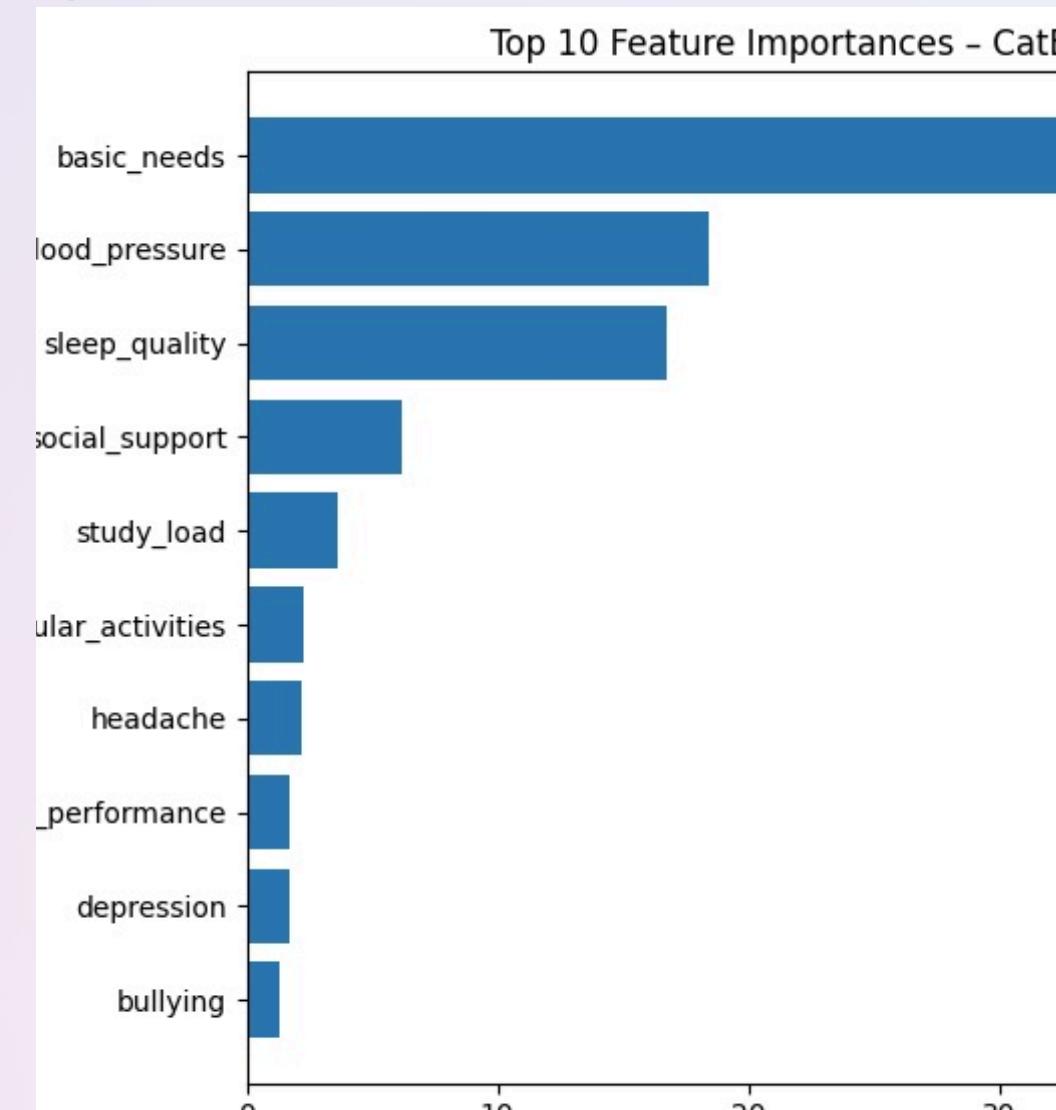
Lifestyle-Based Stress Prediction using CatBoost Regression



CatBoost
ML Algorithm **80/20**
Train/Test Split **Macro F1**
Primary Metric **Feature**
Importance Analysis



EDA- Analysis





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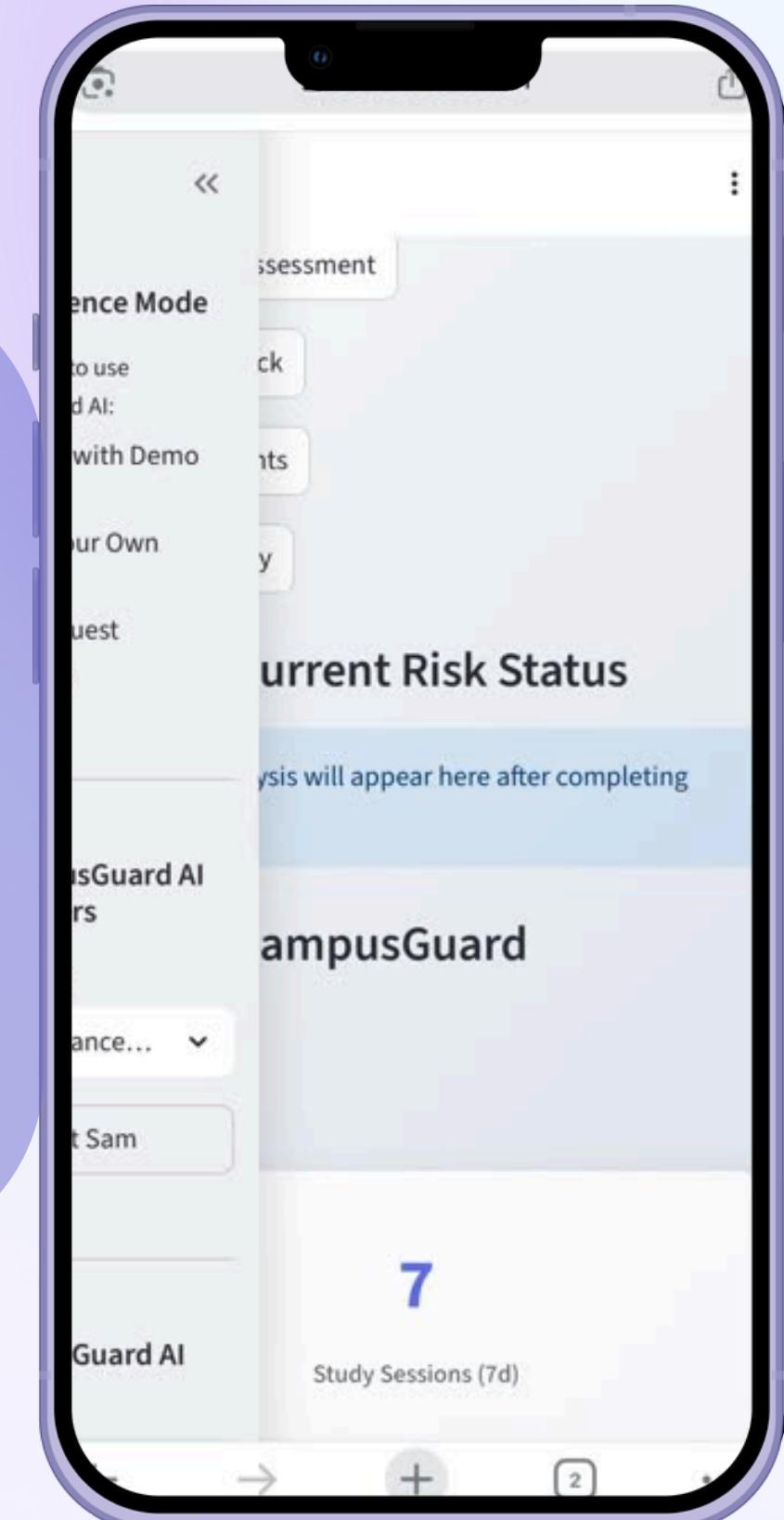
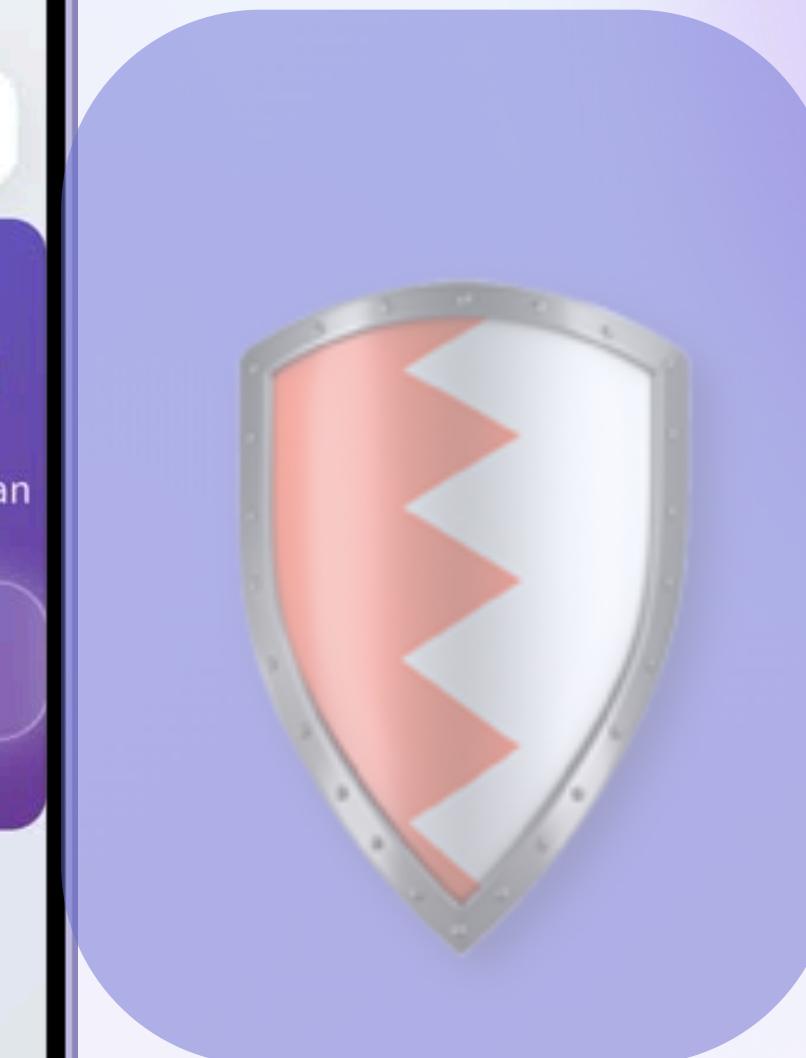
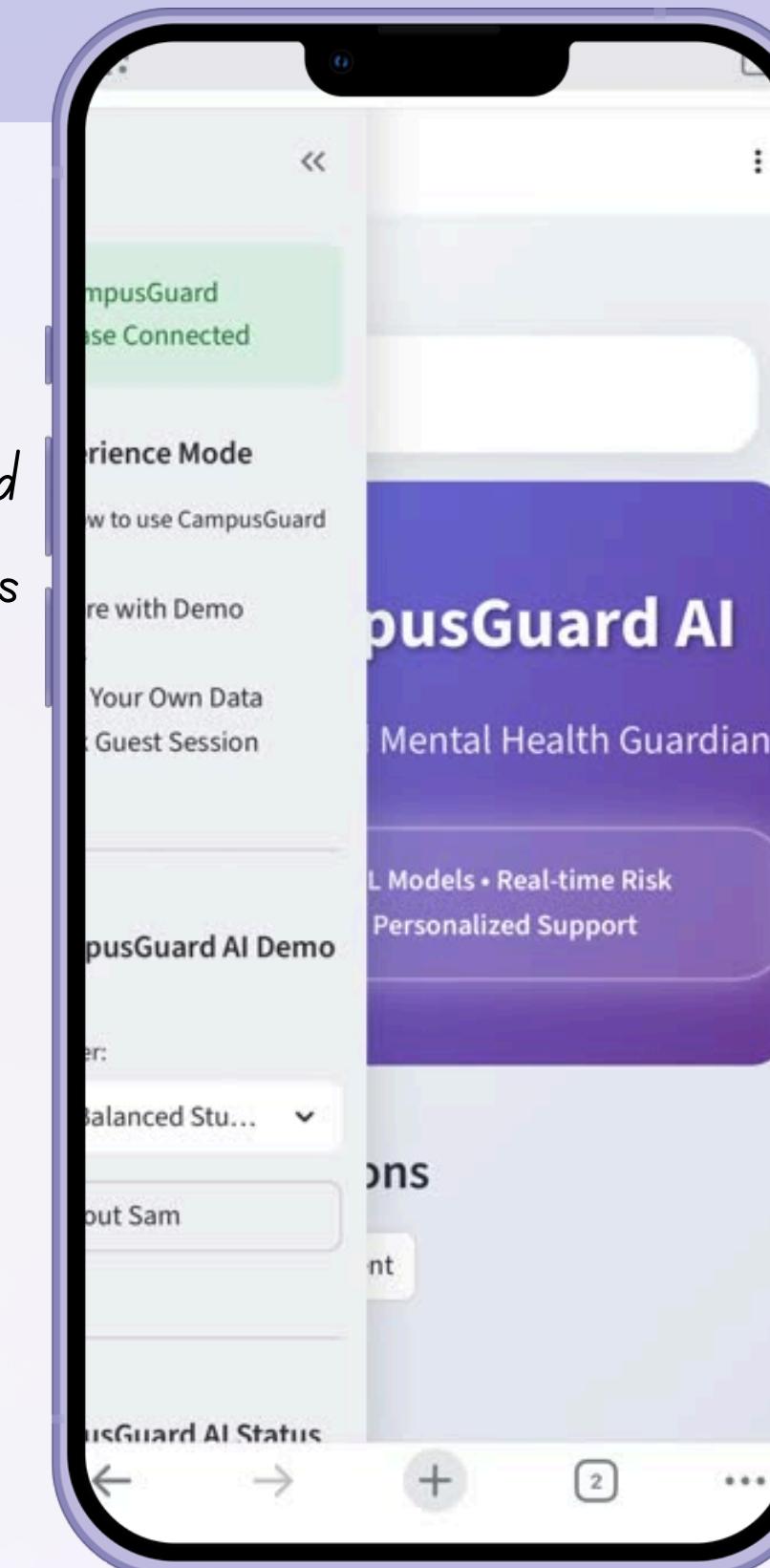
Demo



CampusGuard AI

Your AI-Powered Mental Health Guardian

- Demo showcasing the use case scenarios
- Comprehensive SQL warehouse
- Generated Mock Data for each demo-user
- Both ML models act as the brain of CampusGuard
- Predictions made based on weekly survey questions



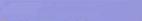
Features

CampusGuard AI Features

Comprehensive Student Wellbeing Platform

-  AI Risk Assessment
-  Smart Study Tracking
-  Financial Wellness
-  Mental Health Monitor
-  Pattern Intelligence
-  CampusGuard Assistant

Data Sources

-  AI Risk Assessments
-  Study Behavior
-  Financial Patterns
-  Wellbeing Data

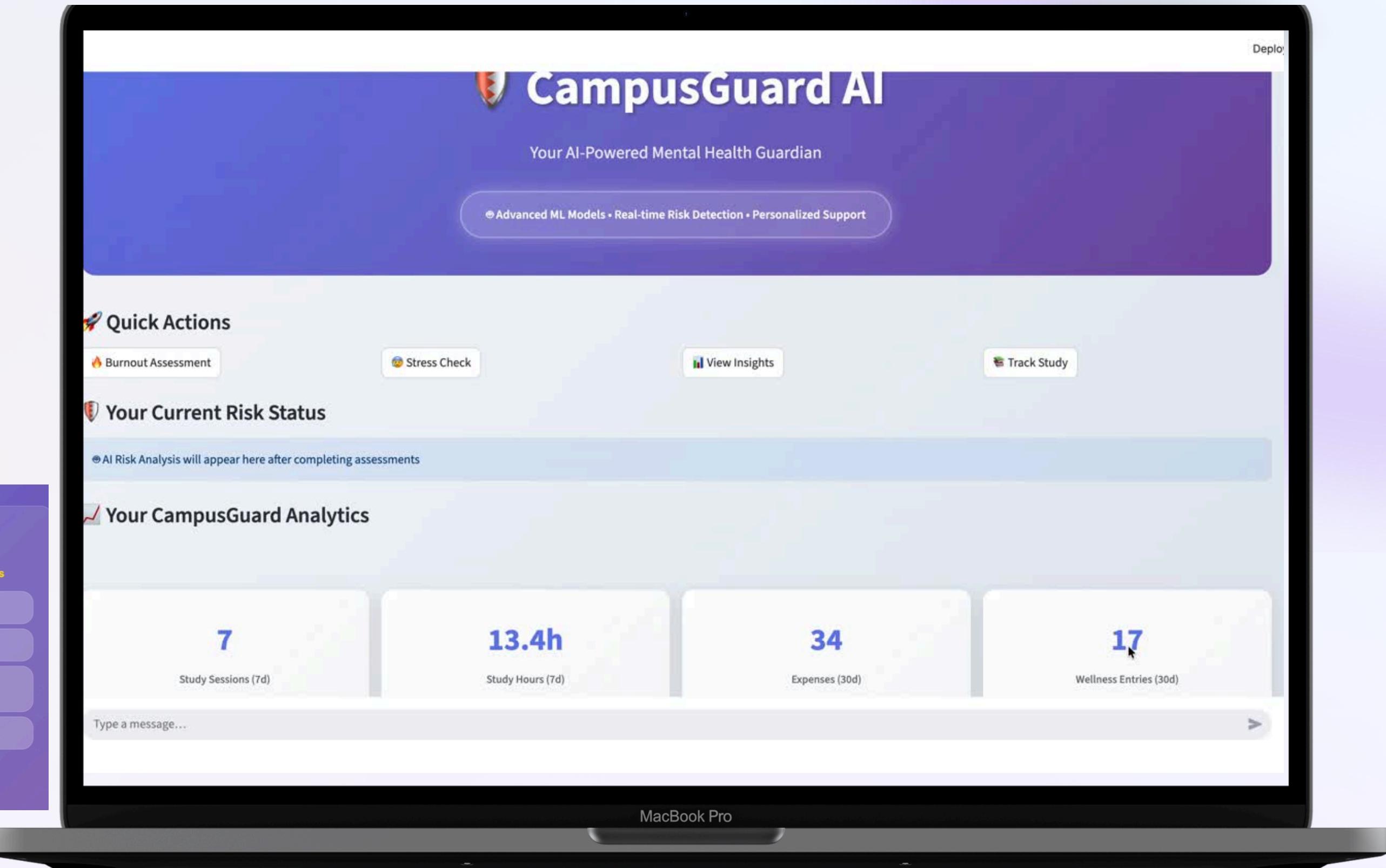
Pattern Intelligence Engine

- Cross-domain correlation analysis
- Temporal pattern detection
- Risk escalation monitoring
- Behavioral trend analysis
- Intervention triggers

Powered by CampusGuard Database

Unified Insights

-  Holistic Risk Profile
-  Root Cause Analysis
-  Personalized Recommendations
-  Trend Predictions

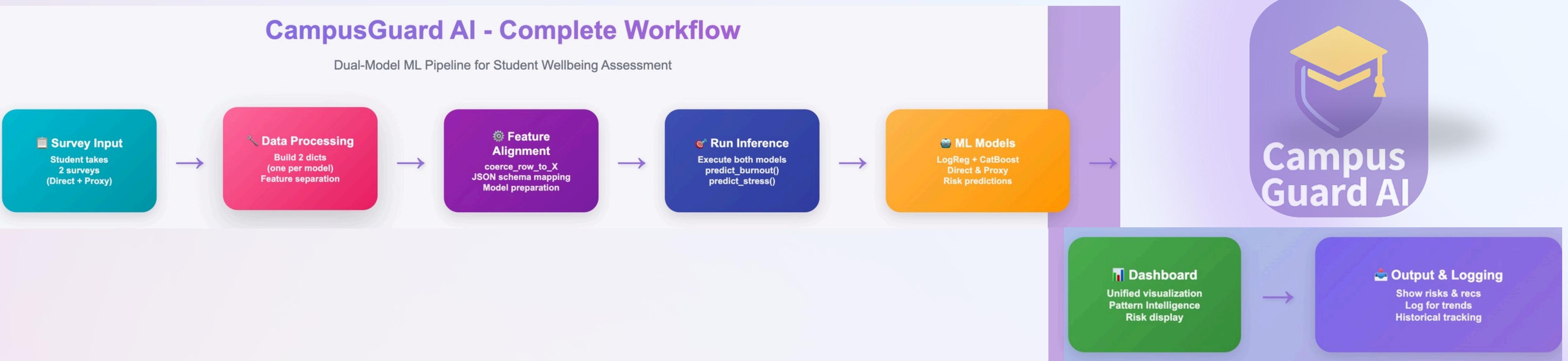


The image shows a smartphone displaying the CampusGuard AI mobile application. The app's header features a shield logo with a red and white design, followed by the text "CampusGuard AI" and "Your AI-Powered Mental Health Guardian". Below the header, a banner highlights "Advanced ML Models • Real-time Risk Detection • Personalized Support". The main screen is divided into several sections: "Quick Actions" with buttons for "Burnout Assessment", "Stress Check", "View Insights", and "Track Study"; "Your Current Risk Status" with a note about AI Risk Analysis appearing after assessments; and "Your CampusGuard Analytics" showing four summary cards: "7 Study Sessions (7d)", "13.4h Study Hours (7d)", "34 Expenses (30d)", and "17 Wellness Entries (30d)". A message input field at the bottom says "Type a message...". The phone is resting on a dark surface with a "MacBook Pro" label visible at the bottom.

Workflow

CampusGuard AI - Complete Workflow

Dual-Model ML Pipeline for Student Wellbeing Assessment



Dual-Model ML Architecture

Scientific validation meets real-world deployment



Direct Burnout Model

- Logistic Regression
- MBI-SS Framework (Validated)
- 282 Medical Students Dataset
- 7-Feature Model:
 - - Emotional Exhaustion (3 items)
 - - Cynicism (2 items)
 - - Academic Efficacy (2 items)

98% Classification Accuracy



Proxy Stress Model

- CatBoost Regression
- Kaggle Stress Dataset
- Lifestyle Proxies:
 - - Sleep Quality
 - - Basic Needs
 - - Social Support
 - - Academic Load
- Real-world Deployment Ready



Feature Engineering

- 122 → 7 Core Features
- Survey Aggregation:
 - - Raw Q-items → MBI Constructs
 - - Validated Subscales
- Composite Risk Scoring
- Feature Alignment via JSON
- Dimensionality Reduction



Risk Classification

- Normalized Score Calculation
- Academic Efficacy Inversion
- Composite Score:
 $(Ex + Cy + AE^{-1}) / 3$
- Three-Tier Classification:
 - - Low: 0.0-0.33
 - - Medium: 0.34-0.66
 - - High: 0.67-1.0
- Feature Alignment via JSON
- Dimensionality Reduction



AI Study Tutor

Personalized learning assistance with your own materials

- Upload lecture notes (PDF, text, images)
- Ask questions: "Explain quantum mechanics from my notes"
- Get personalized explanations based on your materials
- Study guidance: Key concepts, practice questions, summaries



YouTube Study Search

AI-powered discovery of educational content

- AI-powered discovery: Find educational videos by topic
- Smart filtering: Academic content prioritization
- Integration: Links with study sessions and notes
- Learning paths: Curated video sequences for topics



Pomodoro Study Buddy

Focus sessions with wellness-integrated productivity

- Focus sessions: 25-minute productivity blocks
- Smart breaks: Personalized rest recommendations
- Progress tracking: Session statistics and trends
- Wellness integration: Burnout risk consideration

Intelligent Learning & Navigation

AI-Powered Study Tools & Conversational Interface

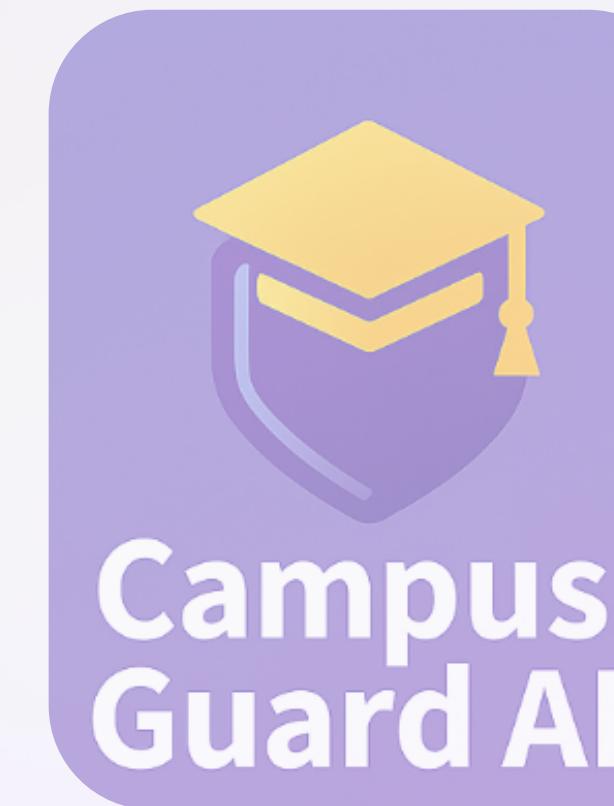
Challenges



CampusGuard AI

Your AI-Powered Mental Health Guardian

- Feature engineering complexity - Reverse coding and aggregating MBI-SS survey items
- SQL Warehouse complexity
- Data Preprocessing
- Streamlit deployment



Next Steps



CampusGuard AI

Your AI-Powered Mental Health Guardian

🚀 Next Steps

Future Roadmap & Platform Evolution

Expanding CampusGuard AI with advanced technologies and comprehensive student support systems for next-generation wellbeing monitoring.



Deep Learning Models

Advanced neural networks for multimodal risk assessment



Peer Support Networks

AI-matched peer support and community features



Fitness App Integration

Integration with fitness apps for more robust health tracking



Smart Study Planner

Computer vision to capture lecture notes and timetables

Conclusion



CampusGuard AI

Your AI-Powered Mental Health Guardian

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The Future of Student Mental Health

Combining cutting-edge machine learning with intuitive design to create the first comprehensive, predictive student wellbeing platform.



Proactive Protection

Early detection before crisis occurs



Personalized Care

Tailored interventions for each student



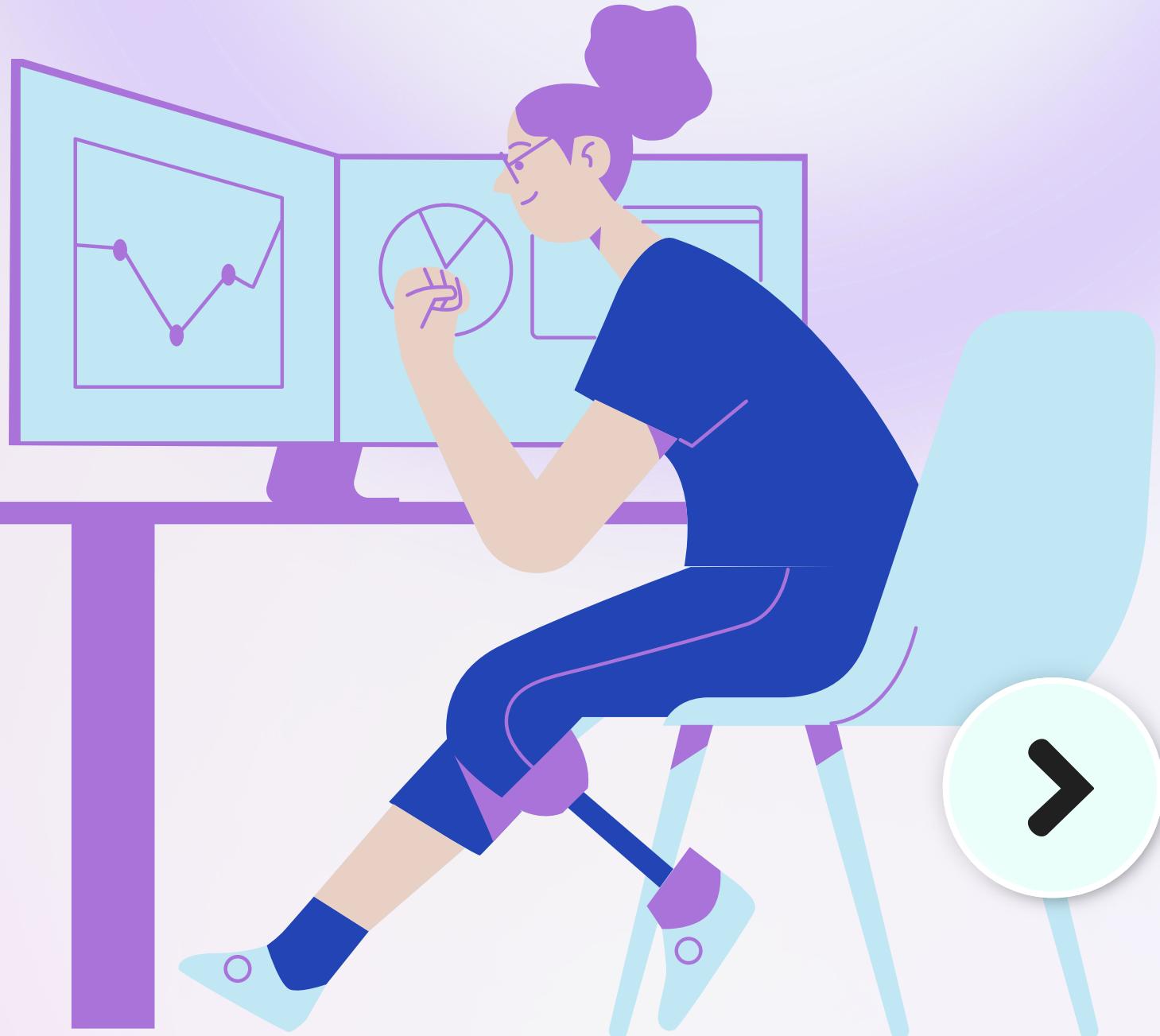
Measurable Impact

Data-driven improvements in wellbeing



Scalable Solution

Ready for campus-wide deployment



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Thank You!



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