**Środowiska uruchomieniowy AutoML**

# Predykcja poziomu zdrowia psychicznego studentów

Aleksandra Demidziuk – s25241

Nazarii Honcharenko – s25249

Mateusz Grzebielec – s21560

## Wstęp

### Cel projektu

Celem niniejszego projektu jest wytworzenie nowoczesnej, intuitywnej web-aplikacji, pozwalającej na łatwą i szybką ewaluację stanu psychicznego przedstawiciela grupy docelowej (dalej studenta) – wyznaczenia czy posiada student różne zaburzenia psychiczne i jeśli tak, to w jakim stopniu. Oczywiście, że do wytworzenia jak najdokładniejszej oceny w takim kompleksowym problemie, a także możliwości do rozwoju i zmianie metodyk ocenienia stanu psychicznego przydadzą się modele uczenia maszynowego.

### Opis wybranej bazy danych

Dany zbiór danych obejmuje dane dotyczące zdrowia psychicznego około 2 tysięcy bangladeskich studentów 15 najlepszych uniwersytetów, zebrane od listopada do grudnia 2023 r. za pomocą Formularzy Google, co czyni, że te dane są dość aktualne, jednak demograficznie są ograniczeni. Obejmuje oceny lęku akademickiego, stresu i depresji przy użyciu szeroko stosowanych skali psychometrycznych.

Link do bazy danych:

<https://www.kaggle.com/datasets/mohsenzergani/bangladeshi-university-students-mental-health>

### Analiza jakościowa

Wszystkie wartości podane w wybranej bazie danych są kategorialne oraz nie ma żadnych brakujący danych. Obecne kolumny to (podział na Anxiety, Stress i Depression przedstawiają podział na modele). Sekcja „Ogólne pytania” opisuje wspólny zbiór danych niezbędnych do działania innych modeli.

#### Ogólne pytania

* "1. Age"
  + 18-22
  + 23-26
  + 27-30
  + Above 30
  + Below 18
* "2. Gender"
  + Female
  + Male
  + Prefer not to say
* "3. University"
  + American International University Bangladesh (AIUB)
  + BRAC University
  + Bangladesh Agricultural University (BAU)
  + Bangladesh University of Engineering and Technology (BUET)
  + Daffodil University
  + Dhaka University (DU)
  + Dhaka University of Engineering and Technology (DUET)
  + East West University (EWU)
  + Independent University, Bangladesh (IUB)
  + Islamic University of Technology (IUT)
  + North South University (NSU)
  + Patuakhali Science and Technology University
  + Rajshahi University (RU)
  + Rajshahi University of Engineering and Technology (RUET)
  + United International University (UIU)
* "4. Department"
  + Biological Sciences
  + Business and Entrepreneurship Studies
  + Engineering - CS / CSE / CSC / Similar to CS
  + Engineering - Civil Engineering / Similar to CE
  + Engineering - EEE/ ECE / Similar to EEE
  + Engineering - Mechanical Engineering / Similar to ME
  + Engineering - Other
  + Environmental and Life Sciences
  + Law and Human Rights
  + Liberal Arts and Social Sciences
  + Other
  + Pharmacy and Public Health
* "5. Academic Year"
  + First Year or Equivalent
  + Fourth Year or Equivalent
  + Other
  + Second Year or Equivalent
  + Third Year or Equivalent
* "6. Current CGPA"
  + - 2.99
  + 3.00 - 3.39
  + 3.40 - 3.79
  + 3.80 - 4.00
  + Below 2.50
  + Other
* "7. Did you receive a waiver or scholarship at your university?"
  + No
  + Yes

#### Anxiety

* "1. In a semester, how often you felt nervous, anxious or on edge due to academic pressure?"
  + 0 - 3
* "2. In a semester, how often have you been unable to stop worrying about your academic affairs?"
  + 0 - 3
* "3. In a semester, how often have you had trouble relaxing due to academic pressure?"
  + 0 - 3
* "4. In a semester, how often have you been easily annoyed or irritated because of academic pressure?"
  + 0 - 3
* "5. In a semester, how often have you worried too much about academic affairs?"
  + 0 - 3
* "6. In a semester, how often have you been so restless due to academic pressure that it is hard to sit still?"
  + 0 - 3
* "7. In a semester, how often have you felt afraid, as if something awful might happen?"
  + 0 - 3
* "Anxiety Value"
  + 0 - 21
* "Anxiety Label"
  + Mild Anxiety
  + Minimal Anxiety
  + Moderate Anxiety
  + Severe Anxiety

#### Stress

* "1. In a semester, how often have you felt upset due to something that happened in your academic affairs?"
  + 0 - 3
* "2. In a semester, how often you felt as if you were unable to control important things in your academic affairs?"
  + 0 - 3
* "3. In a semester, how often you felt nervous and stressed because of academic pressure?"
  + 0 - 3
* "4. In a semester, how often you felt as if you could not cope with all the mandatory academic activities? (e.g, assignments, quiz, exams)"
  + 0 - 3
* "5. In a semester, how often you felt confident about your ability to handle your academic / university problems?"
  + 0 - 3
* "6. In a semester, how often you felt as if things in your academic life is going on your way?"
  + 0 - 3
* "7. In a semester, how often are you able to control irritations in your academic / university affairs?"
  + 0 - 3
* "8. In a semester, how often you felt as if your academic performance was on top?"
  + 0 - 3
* "9. In a semester, how often you got angered due to bad performance or low grades that is beyond your control?"
  + 0 - 3
* "10. In a semester, how often you felt as if academic difficulties are piling up so high that you could not overcome them?"
  + 0 - 3
* "Stress Value"
  + 0 - 40
* "Stress Label"
  + High Perceived Stress
  + Low Stress
  + Moderate Stress

#### Depression

* "1. In a semester, how often have you had little interest or pleasure in doing things?"
  + 0 - 3
* "2. In a semester, how often have you been feeling down, depressed or hopeless?"
  + 0 - 3
* "3. In a semester, how often have you had trouble falling or staying asleep, or sleeping too much?"
  + 0 - 3
* "4. In a semester, how often have you been feeling tired or having little energy?"
  + 0 - 3
* "5. In a semester, how often have you had poor appetite or overeating?"
  + 0 - 3
* "6. In a semester, how often have you been feeling bad about yourself - or that you are a failure or have let yourself or your family down?"
  + 0 - 3
* "7. In a semester, how often have you been having trouble concentrating on things, such as reading the books or watching television?"
  + 0 - 3
* "8. In a semester, how often have you moved or spoke too slowly for other people to notice? Or you've been moving a lot more than usual because you've been restless?"
  + 0 - 3
* "9. In a semester, how often have you had thoughts that you would be better off dead, or of hurting yourself?"
  + 0 - 3
* "Depression Value"
  + 0 - 27
* "Depression Label"
  + Mild Depression
  + Minimal Depression
  + Moderate Depression
  + Moderately Severe Depression
  + No Depression
  + Severe Depression

W czasie przygotowań danych zostały usunięte kolumny:

* "3. University"
* "6. Current CGPA"
* "Anxiety Value"
* "Stress Value"
* "Depression Value"

## Modele uczenia maszynowego

Zostały wybrane trzy modele uczenia maszynowego które odpowiednio skupiały się na Anxiety, Stress i Depression do trenowania ich trafiły odpowiednio dane ogólne jaki szczegółowe dane im odpowiadające.

### Model skupiający się na Anxiety

**Informacje o wartości przewidywanej:**

|  |  |
| --- | --- |
| *count* | 1383 |
| *unique* | 3 |
| *top* | Moderate Stress |
| *freq* | 916 |

**Informacje o wytrenowanych modelach:**

|  |  |  |  |
| --- | --- | --- | --- |
| model | score\_val | can\_infer | fit\_order |
| WeightedEnsemble\_L2 | 0.956229 | True | 6 |
| NeuralNetTorch | 0.952862 | True | 5 |
| ExtraTreesEntr | 0.932660 | True | 4 |
| ExtraTreesGini | 0.932660 | True | 3 |
| RandomForestGini | 0.930976 | True | 1 |
| RandomForestEntr | 0.925926 | True | 2 |

**Model z najwyższym score\_val:**

|  |  |
| --- | --- |
| *accuracy* | 0.9562289562289562 |
| *balanced\_accuracy* | 0.8529656862745099 |
| *mcc* | 0.9056213024249822 |

### Model skupiający się na Stress

**Informacje o wartości przewidywanej:**

|  |  |
| --- | --- |
| *count* | 1383 |
| *unique* | 3 |
| *top* | Moderate Stress |
| *freq* | 916 |

**Informacje o wytrenowanych modelach:**

|  |  |  |  |
| --- | --- | --- | --- |
| model | score\_val | can\_infer | fit\_order |
| WeightedEnsemble\_L2 | 0.956229 | True | 6 |
| NeuralNetTorch | 0.952862 | True | 5 |
| ExtraTreesEntr | 0.932660 | True | 4 |
| ExtraTreesGini | 0.932660 | True | 3 |
| RandomForestGini | 0.930976 | True | 1 |
| RandomForestEntr | 0.925926 | True | 2 |

**Model z najwyższym score\_val:**

|  |  |
| --- | --- |
| *accuracy* | 0.9562289562289562 |
| *balanced\_accuracy* | 0.8529656862745099 |
| *mcc* | 0.9056213024249822 |

### Model skupiający się na Depression

**Informacje o wartości przewidywanej:**

|  |  |
| --- | --- |
| *count* | 1383 |
| *unique* | 6 |
| *top* | Severe Depression |
| *freq* | 350 |

**Informacje o wytrenowanych modelach:**

|  |  |  |  |
| --- | --- | --- | --- |
| model | score\_val | can\_infer | fit\_order |
| ExtraTreesGini | 0.880471 | True | 3 |
| NeuralNetTorch | 0.878788 | True | 5 |
| WeightedEnsemble\_L2 | 0.878788 | True | 6 |
| ExtraTreesEntr | 0.877104 | True | 4 |
| RandomForestGini | 0.863636 | True | 1 |
| RandomForestEntr | 0.860269 | True | 2 |

**Model z najwyższym score\_val:**

|  |  |
| --- | --- |
| *accuracy* | 0.8787878787878788 |
| *balanced\_accuracy* | 0.8997978911327918 |
| *mcc* | 0.8454659169230264 |

## Opis aplikacji

### Wykorzystane technologie

1. Modele postały przy użyciu biblioteki Autogluon.
2. Do wytworzenia interfejsu użytkownika użyto biblioteki Streamlit.

### Opis funkcjonalności

Niniejsza aplikacja umożliwia dla studentów szybkie przejście od 2 do 4 krótkich kwestionariusze i dostanie szybkiego wyniku ewaluacji, która potrafi wyjaśnić różnego rodzaju negatywne uczucia i wesprzeć w podjęciu decyzji związanych z wyzdrowieniem.

## Załączniki

|  |  |
| --- | --- |
| [1] | Aleksandra Demidziuk, Mateusz Grzebielec. Nazarii Honcharenko , „Repozytorium,” 2025. [Online]. Available: https://github.com/Nauaho/WednesdayStruggle. |
| [2] | M. Zergani, “University Students Mental Health,” [Online]. Available: https://www.kaggle.com/datasets/mohsenzergani/bangladeshi-university-students-mental-health. |