

## TEST CASE APLIKASI WEB PREDIKSI KLASIFIKASI TINGKAT OBESITAS

### Ringkasan

Sistem Prediksi Tingkat Obesitas adalah aplikasi web berbasis machine learning yang dirancang untuk mengklasifikasi tingkat obesitas berdasarkan 16 parameter gaya hidup. Aplikasi ini menggunakan arsitektur modern dengan FastAPI sebagai backend dan Streamlit sebagai frontend.

### Arsitektur Aplikasi

- Backend: FastAPI (Port 8000)
- Frontend: Streamlit (Port 8501)
- ML Model: XGBoost Classifier (Model terbaik)

### Struktur Aplikasi

```
web_app/
    ├── app.py      # FastAPI Backend (477 lines)
    ├── frontend.py # Streamlit Frontend (537 lines)
    ├── run_app.py  # Launcher Script (234 lines)
    └── README.md   # Dokumentasi
```

### Fitur Utama

#### Backend API (FastAPI)

##### 1. RESTful Endpoints:

- GET / - Info API
- GET /health - Health check
- GET /model-info - Informasi model
- GET /features - Info parameter input
- POST /predict - Prediksi obesitas

#### Frontend Web (Streamlit)

##### 1. Multi-Page Navigation:

- Beranda - Landing page dengan info sistem
- Prediksi - Form input dan hasil analisis
- Info Model - Detail performance model

-  Analisis - Dashboard visualisasi

## 2. Interface Features:

- Responsive design dengan custom CSS
- Real-time backend connection status
- Interactive input forms dengan validasi
- Visualisasi hasil dengan Plotly charts

## PARAMETER INPUT & OUTPUT

### Input Parameters (16 Features)

Kategori	Parameter	Tipe	Range/Options
<b>Personal</b>	Gender	Categorical	Male/Female
	Age	Numeric	14-61 tahun
	Height	Numeric	1.45-1.98 meter
	Weight	Numeric	39-173 kg
<b>Keluarga</b>	Family History	Categorical	yes/no
<b>Makan</b>	FAVC	Categorical	yes/no
	FCVC	Numeric	1-3
	NCP	Numeric	1-5
	CAEC	Categorical	no/Sometimes/Frequently/Always
<b>Gaya Hidup</b>	SMOKE	Categorical	yes/no
	CH2O	Numeric	1-5 liter

Kategori	Parameter	Tipe	Range/Options
	SCC	Categorical	yes/no
	CALC	Categorical	no/Sometimes/Frequently/Always
<b>Aktivitas</b>	FAF	Numeric	0-7 per minggu
	TUE	Numeric	0-5 jam/hari
	MTRANS	Categorical	Walking/Bike/Motorbike/Public/Auto

#### **Output Classifications (7 Classes)**

1. **Insufficient\_Weight** - Berat badan kurang
2. **Normal\_Weight** - Berat badan normal
3. **Overweight\_Level\_I** - Kelebihan berat badan tingkat 1
4. **Overweight\_Level\_II** - Kelebihan berat badan tingkat 2
5. **Obesity\_Type\_I** - Obesitas tipe 1
6. **Obesity\_Type\_II** - Obesitas tipe 2
7. **Obesity\_Type\_III** - Obesitas tipe 3

## Tampilan Aplikasi

### 1. Halaman Beranda

The screenshot shows the main interface of the "Sistem Prediksi Tingkat Obesitas" (Obesity Risk Prediction System). The top right corner features a "Deploy" button and a three-dot menu icon. On the left, a sidebar titled "Menu Navigasi" includes a dropdown menu for "Pilih Halaman" with "Beranda" selected. Below this, "Info Model" displays an "XGBoost" model with an accuracy of "95.3%" and a CV Score of "94.6%". The main content area has a dark background with a green header bar indicating "Terhubung dengan backend API". A central box says "Selamat Datang" and "Deteksi Dini Risiko Obesitas", with a subtitle explaining it's an AI system for obesity risk analysis based on lifestyle. Below this are three purple boxes: "Analisis Mendalam" (16 parameters analyzed using machine learning), "Visualisasi Interaktif" (interactive graphs and charts for understanding results), and "Rekomendasi Personal" (personalized health recommendations). At the bottom, a section titled "Cara Menggunakan" provides a four-step guide:

- 1 Klik menu Prediksi  
Navigasi ke halaman prediksi
- 2 Isi data diri Anda  
Masukkan informasi gaya hidup dan kebiasaan
- 3 Dapatkan hasil analisis  
Lihat prediksi, risiko, dan rekomendasi
- 4 Terapkan saran kesehatan  
Ikuti rekomendasi untuk hidup lebih sehat

## 2. Halaman Prediksi

The screenshot shows a web-based prediction system for obesity levels. On the left, a sidebar displays navigation options and model information: "Menu Navigasi", "Pilih Halaman: Prediksi", "Info Model: XGBoost", "Akurasi: 95.3%", and "CV Score: 94.6%". The main content area is titled "Sistem Prediksi Tingkat Obesitas" and "Prediksi Tingkat Obesitas". It features a form titled "Data Personal" with sections for "Informasi Dasar" and "Kebiasaan Makan", "Kebiasaan Lainnya", and "Aktivitas & Transportasi". The "Data Personal" section includes fields for gender (Male), age (25), height (1.70 m), weight (79 kg), family history of overweight (yes), and smoking status (yes). The "Kebiasaan Makan" section includes fields for food consumption frequency (high), meal times (3 times a day), snacking (no), and water intake (1 liter). The "Kebiasaan Lainnya" section includes fields for alcohol consumption (no) and calorie monitoring (yes). The "Aktivitas & Transportasi" section includes fields for physical activity frequency (low), screen time (1 hour/day), and primary mode of transport (Walking). A progress bar at the bottom indicates "Analisis Sekarang" (Analysis in progress) and a green bar below it says "Analisis berhasil!" (Analysis successful!). The final result is displayed in a large green box: "Hasil Prediksi" (Prediction Result) showing "Normal Weight" under "Kategori Obesitas Anda" (Your Obesity Category).

Pada halaman ini, aplikasi web sudah berhasil untuk melakukan prediksi berdasarkan input pengguna secara interaktif dan menampilkan hasil prediksinya.

### 3. Halaman Info Model

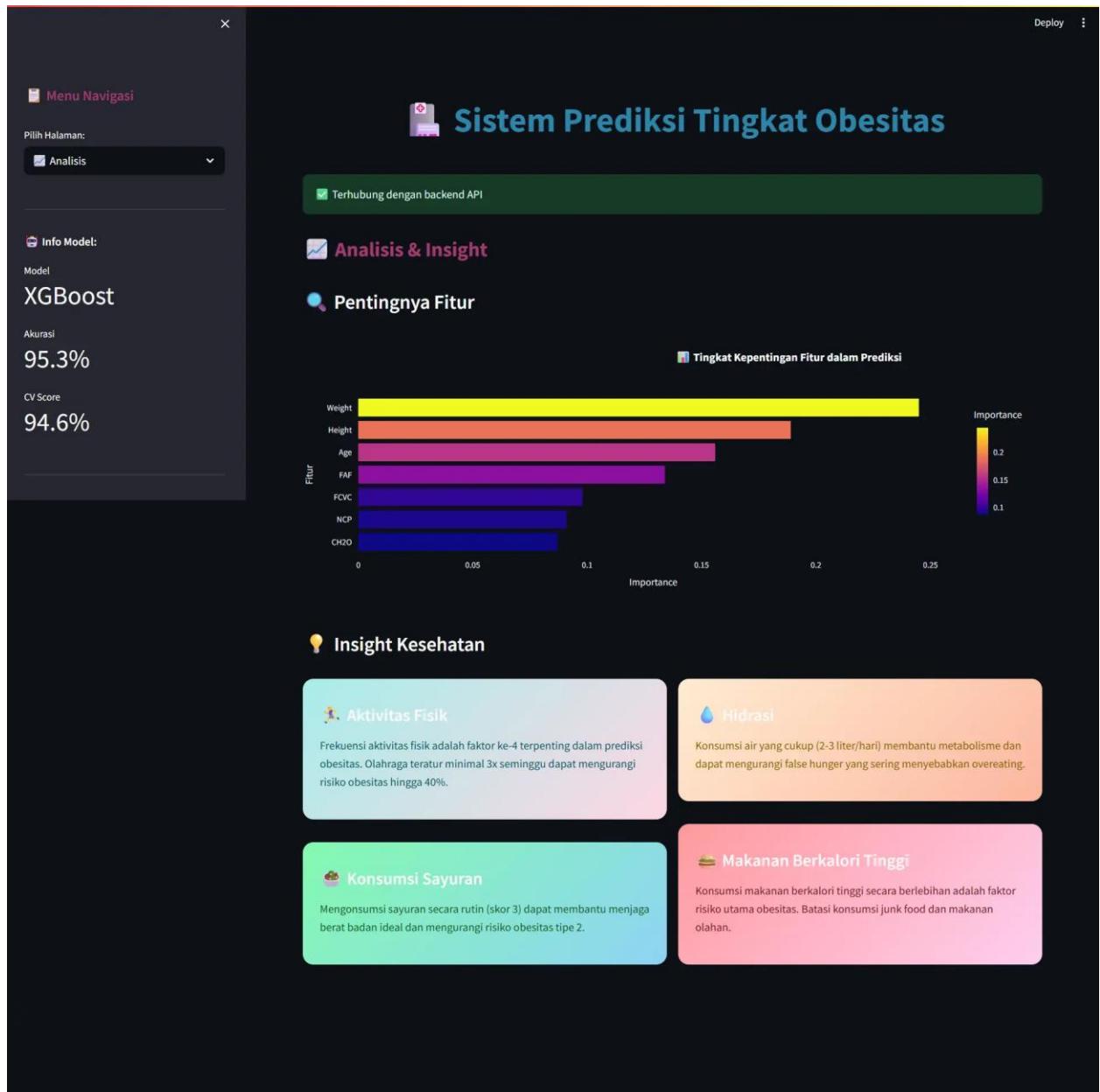
The screenshot displays the 'Sistem Prediksi Tingkat Obesitas' application interface. On the left, a sidebar titled 'Menu Navigasi' shows 'Pilih Halaman: Info Model'. The main content area has a title 'Sistem Prediksi Tingkat Obesitas' with a 'Deploy' button. A green bar at the top indicates 'Terhubung dengan backend API'. The page is divided into several sections:

- Informasi Model:** Shows 'Model XGBoost' with 'Akurasi 95.3%' and 'CV Score 94.6%'.

Metric	Value
Akurasi	95.3%
CV Score	94.6%
- Detail Model:** Displays 'Nama Model: XGBoost', 'CV Score: 0.946', 'Test Accuracy: 0.953', and a 'Kelas Prediksi' list:
  - 1. Insufficient Weight
  - 2. Normal Weight
  - 3. Obesity Type I
  - 4. Obesity Type II
  - 5. Obesity Type III
  - 6. Overweight Level I
  - 7. Overweight Level II
- Performa Model:** A bar chart titled 'Metrik Evaluasi Model' comparing Accuracy (0.953), Precision (0.951), Recall (0.949), and F1-Score (0.950). The Y-axis is 'Score' from 0 to 1, and the X-axis is 'Metric'. A color scale on the right indicates scores from 0.949 (dark purple) to 0.952 (yellow).
- Detail Teknis:** A detailed technical breakdown of the model configuration:

```
model_type: "XGBoost"
training_algorithm: "Supervised Learning"
validation_method: "Stratified K-Fold Cross Validation"
hyperparameter_tuning: "Grid Search CV"
preprocessing: [
    0: "Missing value imputation",
    1: "Outlier treatment (IQR capping)",
    2: "Categorical encoding",
    3: "Feature standardization"
]
evaluation_metrics: {
    Metric: [
        0: "Accuracy",
        1: "Precision",
        2: "Recall",
        3: "F1-Score"
    ],
    Score: [
        0: 0.9528301886792453,
        1: 0.951,
        2: 0.949,
        3: 0.95
    ]
}
```

#### 4. Halaman Analisis



Merupakan halaman tambahan terkait fitur terpenting pada pemodelan XGBoost dan tambahan card terkait pengetahuan terkait tips untuk mengurangi obesitas.