

# MultiSignal Gender Inference — Product Requirements Document (PRD)

## 1. Overview

The goal of this project is to infer a user's gender when it is missing, using three independent signals: first name, sport gender, and a photo-based classifier (or stub). The system produces a probability distribution and confidence score, with full attribution and safety controls.

## 2. Goals

- Provide a structured, interpretable gender inference pipeline.
- Use contextual weights to handle ambiguity and noisy data.
- Allow overriding through explicit user-provided gender.
- Ensure transparent decision-making and graceful fallback.

## 3. Non-Goals

- Not training a real image classifier.
- Not determining identity or verification.
- Not storing facial embeddings or private photo data.

## 4. System Components

1. Signal Ingestion Layer: extracts name, sport category, and photo input.
2. Signal Processing: standardizes signals into probability distributions.
3. Weighting Module: applies dynamic weights based on quality and context.
4. Inference Engine: computes combined probabilities.
5. Override & Safety Layer: enforces explicit overrides and prevents re-inference.

## 5. Workflow

Input profile fields → build signals → compute weights → inference → output gender, confidence, attribution.

## 6. Edge Cases

- Ambiguous first names
- Mixed or unknown sport categories

- Group photos or low-quality images
- Explicit gender present (inference skipped)
- Conflicting signals between name, sport, and photo

#### 7. Output Specification

- inferred\_gender
- p\_male, p\_female
- confidence\_score
- per-signal attribution
- explicit\_gender flag
- skipped\_inference flag

#### 8. Future Extensions

- More sophisticated photo models
- Cultural naming datasets
- Bayesian inference pipeline
- UI for debugging attribution