Intent Prediction in Online Dating:

Algorithmic Alignment & Causal Drivers of Family Planning

python pandas spaCy

scikit learn Shap

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Executive Summary

Optimizing Match Relevance by Decoupling Interest from Intent

Demographics fail to capture the nuance of user intent.

Demographics provide **79% baseline** accuracy for family planning but miss the **child-free** vs. **not ready** distinction.

Romance signals are not a proxy for family planning.

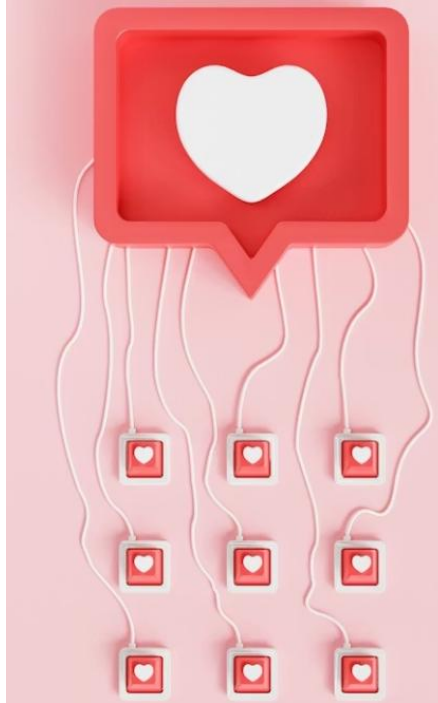
Users seeking “love” and “connection” showed a **0% increase** in family planning, highlighting an inverse of algorithmic assumptions.

Psychographic personas provide improved matching.

Socialite behaviors **increase** family planning by +**18.5%**, while **Techie** interests **decrease** family planning by **-19.8%**.

Algorithmic alignment requires distinct tracks.

Decouple **interest-based** matching from **intent-based** matching to reduce false positives and avoid nudging users toward incompatible partners.



From Data to Insight: The Research Pipeline

Triangulating User Intent via Machine Learning, Natural Language Processing, and Causal Inference

Baseline
Supervised ML

Method:

Trained **Gradient Boosting Classifiers** on structured demographic data (age, sexuality, religion).

Outcome:

Achieved **79% accuracy**, showing demographics are a strong gatekeeper, but fails to distinguish nuances between life stage and lifestyle choices.

Discovery
Unsupervised NLP

Method:

Applied **Latent Dirichlet Allocation (LDA)** to **~60,000** unstructured user essays to identify hidden user themes.

Outcome:

Identified **5 distinct psychographic clusters** (e.g., The Socialite, The Techie, The Romantic) that cut across demographic lines.

Validation
Causal Inference

Method:

Used **Propensity Score Matching (PSM)** to control for confounding variables and calculate persona lift.

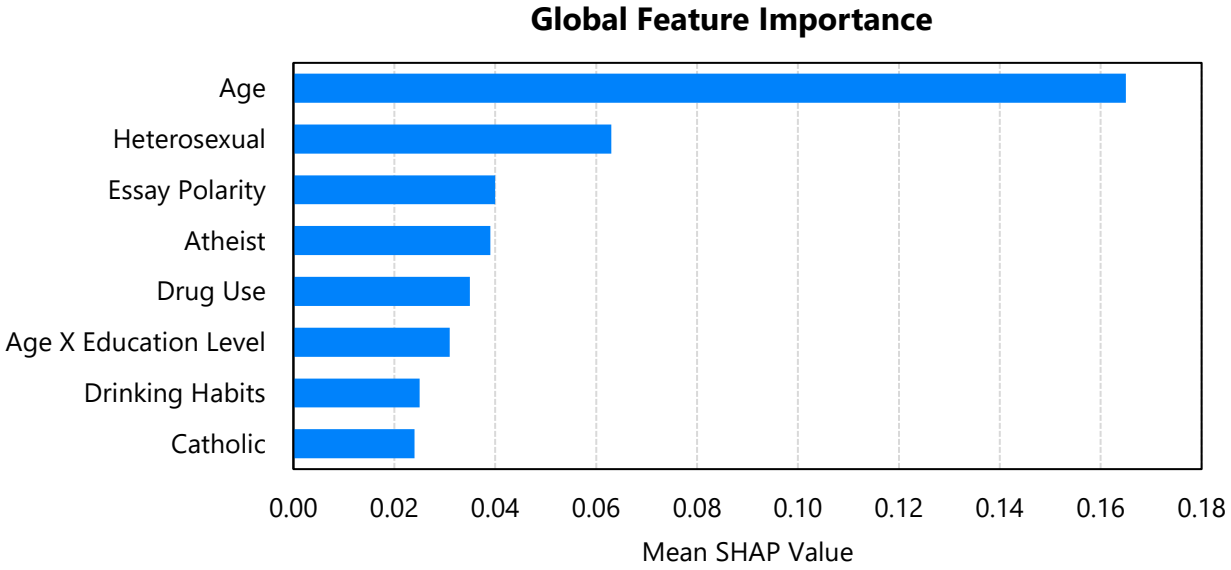
Outcome:

Validated which personas were **causal drivers** of family intent (social behaviors) and which were **proxy signals** (romantic aspirations).

Python | Pandas | NumPy | Matplotlib

Demographics Miss Lifestyle Choice Nuance

Baseline Gradient Boosting Model: SHAP Feature Importance Analysis



Demographic Predictors
(> .02 SHAP Value)

Life Stage:
Age & Age X Education Level

Identity:
Sexual Orientation & Religion

Emotional Disposition:
Essay Polarity

Habits:
Drug Use & Drinking Habits

The model focuses too heavily on **Life Stage** and misses **Lifestyle Choices**

A 35-year-old **child-free** user is **identical** to a 35-year-old **family-seeker**, leading to high-friction matches.

Python | XGBoost | SHAP | Scikit-Learn

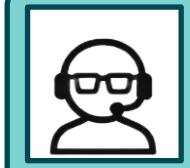
Unlocking Psychographics: Language is a Behavior

Latent Dirichlet Allocation (LDA) Topic Modeling of User Essays

The Artist

Keywords:
Art, Film, Band

Signal: Non-traditional lifestyle; values expression, creativity, and aesthetics



The Techie

Keywords:
Game, Video, Computer

Signal: Niche interests; highly specific media and tech culture compatibility

The Socialite

Keywords:
TV, Sports, Dinner

Signal: High social activity; values community and shared experiences

The Professional

Keywords:
Work, Home, Business

Signal: High ambition; prioritizes stability and career trajectory

The Romantic

Keywords:
Relationship, Soul, Heart

Signal: Intimacy-focused; explicitly seeking deep emotional connection

Python | SpaCy | Gensim | pyLDAvis

Lifestyle Choices Drive Family Planning

Validating Causal Drivers via Propensity Score Matching (PSM)

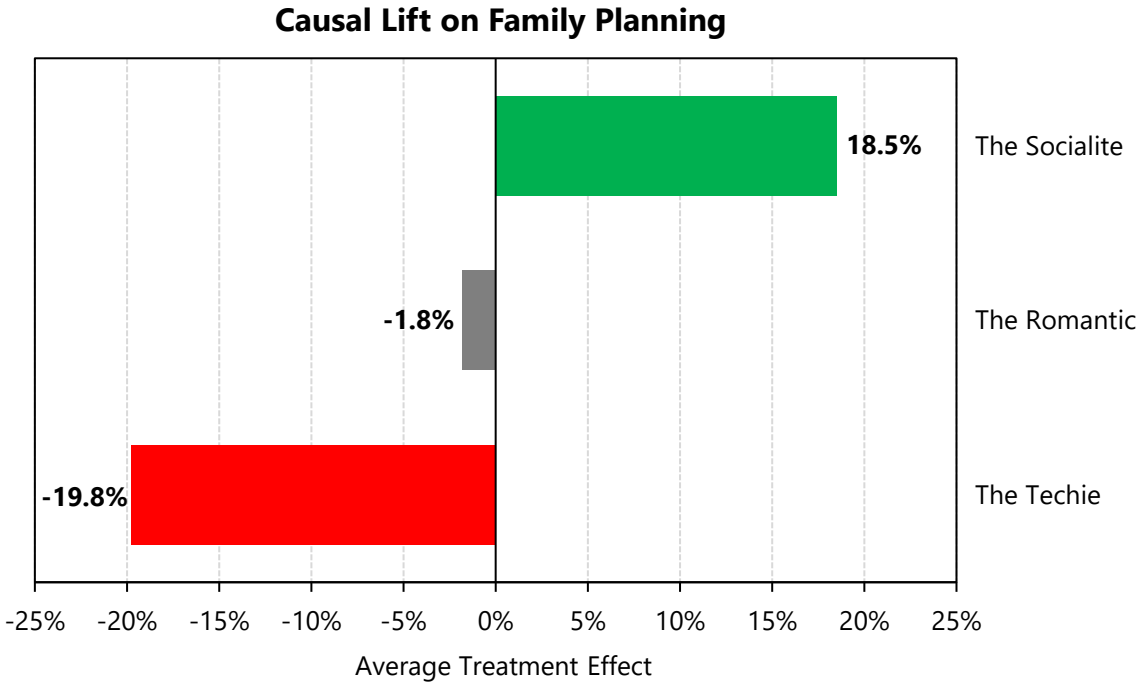
Propensity Score Matching

Challenge:
Are certain personas (e.g., Socialites) more family-oriented, or just older?

Method:
Create statistical "twins" for every user (a demographically identical "non-persona") to isolate causal effects.

Insight:
Lifestyle choice is a significant causal driver.

- **Socialites**: Community focus aligns with family goals.
- **Techies**: Niche interests compete with family planning.
- **Romantics:** "Love" signals are noise, proving intent is distinct from connection.



Python | Scikit-Learn | SciPy | Statsmodels

From Insight to Impact: Strategic Recommendations

Optimizing Product Features Based on Psychographic Drivers

The Algorithm

Decouple Interest from Intent

Insight:

Niche interests **actively suppress** family intent signals.

Recommendation:

Downweight **interest-based** matching. Prioritize **latent psychographics** as a primary feature.

The Onboarding

"Lifestyle" Signal Onboarding

Insight:

Demographics achieve **79% accuracy** but miss nuance.

Recommendation:

Replace static demographic filters with a **visual lifestyle quiz**. Let users self-select into specific psychographic tracks (e.g., Socialite, Romantic).

The Growth

Segmented Value Proposition

Insight:

"Romantics" seek **connection**, not commitment.

Recommendation:

Stop retargeting "Romantic" users with ads about family. Shift focus to **"deep connection" messaging** to align with actual intent.

Product Strategy | A/B Testing | Algorithmic Auditing