Behavioral Segmentation Agent - MVP PRD

Objective

Build a minimum viable product (MVP) for an AI-powered Behavioral Segmentation Agent that processes user event data from platforms like the platform. The goal is to cluster users based on behavioral patterns, detect retention and drop-off risks, and automatically suggest product experiments to improve user engagement, conversion, and deal flow efficiency.

Key Features

1. User Behavior Log Ingestion:
- Accept CSV or JSON logs with events like 'create_term_sheet', 'revise_offer', 'accept', 'drop_off'.

2. Feature Engineering:
- Derive time between actions, session duration, number of revisions, etc.
- Construct session-level and user-level aggregated features.

3. Clustering:
- Apply UMAP + HDBSCAN or KMeans.
- Visualize clusters with t-SNE or UMAP.
- Label clusters based on average behavior and drop-off likelihood.

4. Retention Modeling:
- Use simplified churn proxy (e.g., 'drop_off' event) or implement Cox Proportional Hazards Model.
- Show retention curves per cluster.

5. Insight & Recommendation Agent:
- Use GPT-4 or similar LLM to suggest product experiments per cluster.
- Ground LLM prompts in actual metrics (e.g., drop-off rate = 63%).

MVP Deliverables

- Simulated dataset of 1000 users over 1 week

Behavioral Segmentation Agent - MVP PRD

- Notebook or script for cleaning + feature engineering
- Clustering model and retention analysis visualizations
- LLM suggestion interface (via OpenAI API)
- Streamlit dashboard for showcasing full flow (optional)

Timeline & Milestones

Saturday:

- Simulate user behavior dataset
- Build feature engineering and sessionization logic
- Apply clustering algorithm and visualize results

Sunday:

- Perform retention/drop-off analysis
- Integrate LLM and prompt tuning
- Build final dashboard and polish demo
- Record demo or export PDF report

Tech Stack

- Python (pandas, numpy, scikit-learn, umap-learn, hdbscan, lifelines)
- LLM API: OpenAI (gpt-4)
- Optional UI: Streamlit or Jupyter
- Version Control: Git + GitHub
- Deployment (if time): Hugging Face Spaces or Streamlit Cloud

Frontend Options:

- Streamlit: Best for fast prototyping and data visualization dashboards.
- FastAPI: Better if you want to serve APIs or integrate with custom frontends like React.
- Recommendation: Use Streamlit for this MVP due to speed and simplicity; migrate to FastAPI if production-grade APIs are needed.

Behavioral Segmentation Agent - MVP PRD

Success Criteria

- >=3 meaningful behavioral personas identified
- Drop-off rates clearly quantified per cluster
- >=3 insightful experiment ideas generated by the agent
- Demo script or app showing complete pipeline