Oracle Engine Web Application - TODO

Project Overview

Full-stack web application for predicting horse race winners and sequences of four consecutive race winners using advanced machine learning models trained on historical and global betting data.

Core Features

Backend API & Models

- [x] ~~Initialize full-stack web project with tRPC, Express, and React~~
- [ ] Integrate trained ML models (Gradient Boosting, Random Forest, XGBoost, LightGBM)
- [ ] Copy feature engineering script to backend
- [ ] Create `/api/predict` endpoint for single-race predictions
- [ ] Create `/api/predict_streak` endpoint for four-race streak predictions
- [ ] Create `/api/model_info` endpoint for model metadata
- [ ] Implement API key authentication and rate limiting
- [ ] Add database schema for predictions, API keys, and user subscriptions

Database Schema

- [ ] Create `predictions` table to store prediction history
- [ ] Create `api_keys` table for user API access management
- [ ] Create `subscriptions` table for subscription tiers (Free, Basic, Premium, Elite)
- [ ] Create `user_credits` table for tracking API call limits
- [ ] Add indexes for efficient querying

Frontend - Public Pages

- [ ] Design landing page with hero section and feature overview
- [ ] Create pricing/subscription page with tier descriptions
- [ ] Create documentation/API reference page

- [ ] Create about page with Oracle Engine explanation

Frontend - User Dashboard

- [ ] Create user authentication flow (Manus OAuth integration)
- [ ] Build dashboard layout with sidebar navigation
- [ ] Create prediction history page
- [ ] Create single-race prediction interface
- [ ] Create four-race streak prediction interface
- [ ] Create API key management page
- [ ] Create subscription management page
- [ ] Create usage statistics and analytics dashboard

Frontend - Prediction Interfaces

- [ ] Single-race prediction form (horse name, track, race type, distance, etc.)
- [ ] Single-race prediction results display (probability, confidence, model breakdown)
- [ ] Four-race streak prediction form (4 race inputs)
- [ ] Four-race streak results display (streak probability, individual probabilities, odds)
- [ ] Batch prediction interface for multiple races
- [ ] Prediction history table with filters and sorting

Subscription & Monetization

- [ ] Implement Free tier (limited predictions per month)
- [ ] Implement Basic tier (more predictions, API access)
- [ ] Implement Premium tier (unlimited predictions, advanced features)
- [ ] Implement Elite tier (priority support, custom models)
- [ ] Create subscription upgrade/downgrade flow
- [ ] Implement credit system for API calls
- [ ] Create billing/payment integration (placeholder for now)

Admin Features

- [ ] Create admin dashboard for system monitoring
- [ ] Add user management interface
- [ ] Add model performance metrics display
- [ ] Add system logs and audit trails
- [ ] Add feature flags for A/B testing

Documentation & Help

- [ ] Create comprehensive API documentation
- [ ] Create user guide for prediction interfaces
- [ ] Create FAQ page
- [ ] Create contact/support page
- [ ] Create blog/news section

Testing & Quality

- [ ] Write unit tests for prediction endpoints
- [ ] Write integration tests for tRPC procedures
- [ ] Test authentication flow
- [ ] Test subscription tier restrictions
- [ ] Performance testing for model inference
- [ ] Load testing for concurrent predictions

Deployment & DevOps

- [ ] Set up CI/CD pipeline
- [ ] Configure environment variables
- [ ] Set up monitoring and alerting
- [ ] Configure backup and disaster recovery
- [ ] Set up CDN for static assets
- [ ] Configure SSL/TLS certificates

Security

- [ ] Implement rate limiting on API endpoints
- [ ] Add CSRF protection
- [ ] Implement input validation and sanitization
- [ ] Add SQL injection protection (via ORM)
- [ ] Implement API key rotation mechanism
- [ ] Add audit logging for sensitive operations

Performance Optimization

- [ ] Optimize model inference performance
- [ ] Implement caching for frequently accessed predictions
- [ ] Optimize database queries with indexes
- [ ] Implement pagination for large datasets
- [ ] Optimize frontend bundle size
- [ ] Implement lazy loading for components

Analytics & Monitoring

- [ ] Set up user analytics tracking
- [ ] Create prediction accuracy metrics
- [ ] Monitor API response times
- [ ] Track user engagement metrics
- [ ] Create performance dashboards

Phase 1: Core Backend Integration

- [ ] Copy trained models to project
- [ ] Implement prediction procedures in tRPC router
- [ ] Create database schema for predictions and subscriptions
- [ ] Implement API authentication

Phase 2: User Dashboard & Frontend

- [ ] Build dashboard layout

- [ ] Create prediction interfaces
- [ ] Implement user authentication
- [ ] Create subscription management UI

Phase 3: Public Website

- [ ] Design and build landing page
- [ ] Create pricing page
- [ ] Create documentation
- [ ] Create about page

Phase 4: Testing & Deployment

- [ ] Write tests
- [ ] Deploy to production
- [ ] Monitor and optimize
- [ ] Gather user feedback

Known Issues & Bugs

- [x] ~~Prediction service endpoints not accessible after authentication~~
- [x] ~~Dashboard prediction pages need to be created and tested~~
- [x] ~~Model loading needs to be verified in Node.js environment~~
- [x] ~~Prediction form is overly complicated with too many manual input fields~~
- [x] ~~Need to simplify UI with dropdowns and auto-populated fields~~
- [ ] Missing live data feed integration for real-time predictions
- [x] ~~Need to research Tab.co.nz interface design patterns~~

Current Sprint

- [ ] Research and evaluate live horse racing data APIs
- [ ] Select best API based on features, cost, reliability
- [ ] Implement backend service for live data fetching

- [ ] Update frontend with live race data
- [ ] Test and deploy live feed integration

Future Enhancements

- [ ] Integrate live horse racing data feeds (Betfair, Racing Post, etc.)
- [ ] Auto-populate race data from live sources
- [ ] Mobile app integration
- [ ] Real-time prediction updates
- [ ] Implement Tab.co.nz-style interface patterns
- [ ] Add quick-pick functionality for common races
- [ ] Machine learning model retraining pipeline
- [ ] Advanced analytics and reporting
- [ ] Integration with betting platforms
- [ ] Multi-language support
- [ ] Dark mode support