Bidding on [P2024-08] AI-Powered Digital Signage for Targeted and Personalized Advertisement

Bidder: TEAM2024.07

1. **Project Summary and Understanding:**

   In modern advertising, digital signage is a powerful tool for delivering targeted and personalized ads. AI technologies, such as computer vision and Large Language Models (LLMs), enable the analysis of vast data to understand consumer behavior, preferences, and trends. Computer vision can identify demographics like age and gender through image and video analysis, while LLMs generate personalized ad content based on this data and user context, creating more relevant and engaging advertisements in real-time.

2. **Team Member and Project Matching Degree:**

   Our team members have basic knowledge of Python and are interested in machine learning algorithms, particularly in computer vision and natural language processing. We have skills in data analysis and data mining, allowing us to effectively process, analyze, and model user data. This expertise includes training models with datasets, as well as performing classification, clustering, and regression analysis to develop accurate ad recommendation systems. Additionally, our team understands marketing principles and strategies and is knowledgeable about digital advertising mechanisms, such as programmatic advertising and real-time bidding. This ensures that our AI models can deliver relevant ad content with precision. We can analyzing users' browsing habits and purchasing tendencies, focusing on targeted and personalized advertising to provide users with a customized ad experience through comprehensive behavioral data analysis.

3. **Envision Project Solutions:**

   Using computer vision technology and supervised learning, the system can analyze key user characteristics in real-time, such as gender, age, and emotional states. This information allows the digital signage to dynamically adjust ad content, ensuring that ads align with the users’ interests or emotions. For example, if the system detects a positive emotional state, it may push entertainment or shopping-related ads. If the mood is neutral or low, it can switch to relaxing or encouraging content. This real-time responsive advertising not only captures user attention but

also increases interaction and engagement with the ads.

By integrating a large language model (LLM) into the advertising system, it can generate ad copy that matches the language habits and preferences of different users. AI can automatically create user-relevant ad content based on real-time data, offering a more "conversational" ad experience. This not only boosts user interest but also enhances the ad's persuasiveness and relevance. For instance, the system can generate more appealing wording or tone according to the user's age, precisely targeting specific demographics.

To enhance ad interactivity, it is recommended to integrate touchscreens or voice recognition features into the digital signage, allowing viewers to interact with the ads and provide real-time feedback. This feedback further strengthens the system's learning capabilities, optimizing ad targeting strategies based on user engagement. Continuous data feedback and performance monitoring will help in iterating and improving ad campaigns. Regularly adjusting ad content and targeting strategies based on actual performance ensures the ads better match the target user.

4. Project Management and Scheduling:

Task	Duration	Start Date	End Date (3 pm)
Announcement of Bidding Results (hypothetical)	1 week	2024.10.9	2024.10.16
Equipment requests	1 week	2024.10.16	2024.10.23
Completed Ethics forms	/	2024.10.16	2024.10.31
Team Project Website	1 week	2024.10.16	2024.10.23
Project Planning and Research	2 weeks	2024.10.23	2024.11.5
Computer Visual Model Development	3 weeks	2024.11.6	2024.11.27
Interim Group Report (4000-5000 words)	1 week	2024.11.28	2024.12.5

Optimize The Model and Integrate LLM	2 weeks	2025.1.10	2025.1.24
User Interface Design	2 weeks	2025.2.5	2025.2.19
Testing, Debugging, and Refinement	2 weeks	2025.2.19	2025.3.5
Final Review and Documentation	2 weeks	2025.3.5	2025.3.19
Team final reports (7000-8000 words) and software	3 weeks	2025.3.12	2025.4.2
Recording of Software Demonstration/ Recording of Team Presentation/ Team Promotional Digital Artifact	2 weeks	2025.3.26	2025.4.9
Prepare (TBC) Open Day and Live Q&A (1min Intro)	1 week	2025.4.9	2025.4.16
Individual final reports (2000–2500 words)	2 weeks	2025.4.8	2025.4.22

5. Possible Equipment Requirements:

■ **Technology:**

1) HTML5/JavaScript: Used for designing and dynamically updating ad content on digital signage.
2) OpenCV: Computer vision library for image and video processing.
3) TensorFlow/PyTorch: Deep learning frameworks that can be used for training and deploying models like facial recognition and emotion analysis.
4) Dlib/FaceNet: Used for facial detection and feature extraction.
5) Hugging Face Transformers: Provides many pre-trained language models that can be used for natural language processing (NLP) tasks.
6) Pandas, NumPy: Data processing and analysis libraries used for handling user historical data, click behavior, etc.
7) UI design tool（e.g. React/Vue.js）: Used for developing interactive interfaces on advertising screens for user interaction.
8) A/B test tool（e.g. Optimizely）: Used for testing the effectiveness of different ad content to optimize ad delivery strategies.
9) supervised learning

■ **Equipment:**

1) Cameras, Sensors, Touch screen: Collect visual and environmental data and information from the user.