ArtiSight: An AI Photo Critique Platform

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ABSTRACT

Photography is a passionate and expressive form of art, where feedback and critique are crucial for developing a photographer's skills. Traditional methods of obtaining feedback, such as workshops, peer reviews, or social media platforms, have limitations in terms of accessibility, diversity, and proximity. To address this, our project proposes ArtiSight, an AI Photo Critique Assistant, a platform designed to offer immediate, constructive, and personalized critiques for photographers at any level, leveraging the capabilities of Large Language Models (LLMs).

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1 PROBLEM STATEMENT

Photographers, particularly those new to the field or in less accessible areas, often struggle to obtain constructive, timely, and diverse feedback on their work. This gap in resources can hamper their creative growth and development. There is a clear need for a more accessible and immediate platform that can provide personalized and insightful critiques tailored to each photographer's unique style and objectives.

1.1 Background

Feedback in photography is essential, not just as a form of validation but as a tool for learning and improvement. Constructive criticism helps photographers understand their strengths and areas for improvement, encouraging a continuous learning process. The AI Photo Critique Assistant wants to make it easy for everyone to get good feedback, promoting a more inclusive, diverse, and educated photography community.

1.2 Competitor Analysis

Various platforms exist for sharing and discussing photography, each with unique features and limitations. Community image-sharing platforms such as Pinterest and Unsplash allow users to share their work and gather inspiration. However, feedback on these platforms is primarily limited to likes or views, offering little in terms of constructive criticism or specific guidance. While these platforms excel in showcasing and discovering photographic works, they fall short in providing the detailed, actionable feedback that photographers need to improve their skills.

Figure 1: Competitors

Social media sites such as Instagram, Reddit, and Twitter enable more interaction through comments. However, the type of feedback can vary a lot. Often, comments on these sites are short, do not have much constructive detail, or lean heavily towards positive comments because of social reasons. While this can be encouraging, this kind of feedback does not always give photographers the critical insights they need to see where they can get better or challenge their artistic methods. Also, the large and varied audience on these platforms can lead to a wide range of feedback quality, with many comments not being helpful for artistic growth.

In contrast, community-based feedback platforms specifically dedicated to photography, such as Flickr and 500px, offer a space for more focused and detailed critiques. However, even on these platforms, the feedback can be inconsistent in quality and is often

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influenced by the social and networking aspects of the sites. Photographers may receive some constructive comments, but these are not guaranteed and can be buried among less helpful praise or generic comments.

The lack of personalized, structured, and immediate critique across these various platforms highlights the gap in the current ecosystem for photography feedback. While LLMs have been utilized in various creative fields, their application in providing detailed, personalized photo critiques remains underexplored. This gap underscores the need for a dedicated tool like the AI Photo Critique Assistant, which aims to provide consistent, constructive, and tailored feedback to help photographers grow and refine their skills.

1.3 Novelty

The AI Photo Critique Assistant is distinct in its use of LLMs specifically tailored for photographic critique. Unlike the generic or subjective feedback often found in community-based platforms, our system will provide insightful, objective, and specific critiques, focusing on elements such as composition, lighting, color, and subject matter.

2 LITERATURE REVIEW

(Murray et al., 2012) presents a new database named AVA, designed to advance research in computational aesthetics by addressing the limitations of existing datasets. With over 250,000 images and extensive metadata including aesthetic scores, semantic labels, and photographic styles, AVA stands out in terms of scale, diversity, and annotation richness. The authors explore AVA's potential through various applications, demonstrating how the dataset leads to improved performance in aesthetic quality categorization and offers new insights into the interplay between image content, style, and aesthetic appeal. This comprehensive dataset paves the way for more nuanced studies and models in the field of visual aesthetics, highlighting the importance of large-scale, diverse, and well-annotated datasets in advancing computational aesthetic analysis.

(Lu et al., 2015) explore the challenges of assessing image aesthetics and quality for detailed analysis of images. Traditional deep CNNs rely on a single patch from an image. The authors introduce a novel approach, the Deep Multi-Patch Aggregation Network (DMA-Net), which utilizes multiple patches from a single image for training. This method addresses the limitations of previous approaches that often overlook fine-grained details critical for assessing image quality, aesthetics, and style.

(Chang et al., 2017) introduces a novel approach that does not merely describe an image but critiques its aesthetic and photographic qualities. This significantly differs from traditional AQ (Aesthetic Quality) assessments that provide binary good or bad ratings. Instead, their system delves into why a photo may be visually appealing or not, offering a more nuanced analysis that could aid photographers in enhancing their skills. They also introduce a new dataset for aesthetics captioning called the Photo Critique Captioning Dataset (PCCD), which contains pair-wise image-comment data from professional photographers.

(Wang et al., 2018) introduces an innovative approach to not just rate images based on aesthetic quality but also to provide textual explanations for the ratings, extending beyond conventional classification or regression problems in image aesthetics. They propose two multi-task architectures leveraging shared aesthetic semantic layers and task-specific embedding layers, designed to improve performance across distinct tasks. Their system can automatically classify images as high or low aesthetic while generating descriptive comments that align with human perceptions of beauty and style. A significant contribution is the collection and utilization of the AVA-Reviews dataset, which consists of over 52,000 images and 312,708 comments, facilitating in-depth research into the intersection of vision and language for image aesthetics. This study stands out by tackling the challenge of bridging the gap between numeric aesthetic ratings and the qualitative aspects that lead to these ratings, providing insights into how and why certain visual features affect human aesthetic judgments.

(Jin et al., 2019) present an innovative approach in the field of Image Aesthetic Quality Assessment (IAQA) by introducing a model named Aesthetic Multi-Attribute Network (AMAN), which is trained on both fully-annotated and weakly-annotated datasets for assessing aesthetic attributes of images. The authors developed a new DPC-Captions dataset utilizing knowledge transfer to facilitate this multi-attribute aesthetic assessment. The AMAN model incorporates transfer learning and attention mechanisms, outperforming traditional models in predicting aesthetic attributes and generating relevant captions. The significance of this study lies in its novel approach to combining captions with aesthetic scoring for each attribute, enhancing the understanding of image aesthetics beyond binary classifications. The research opens new avenues in automated aesthetic evaluation, with potential applications in art criticism, photo editing, and content curation. The findings indicate a shift towards a more nuanced and comprehensive assessment of image quality, bridging the gap between numerical scoring and human-like interpretation of aesthetics.

(Nieto et al., 2022) references creating and utilizing the Reddit Photo Critique Dataset (RPCD) for aesthetic assessment, diverging from traditional numerical scoring methods in favor of detailed critiques sourced from Reddit. The research emphasizes the dataset's potential in aligning computational models with human aesthetic judgments through sentiment analysis, underscoring the shift towards more interpretable aesthetic assessment models. The detailed dataset includes a substantial collection of images and comments, offering a comprehensive foundation for future research in visual aesthetics.

3 PROJECT FLOW

Our project integrates machine learning models with an intuitive user interface to provide photographers with a seamless and educational experience. The project flow is designed to be user-centric and straightforward, facilitating easy engagement and actionable insights.

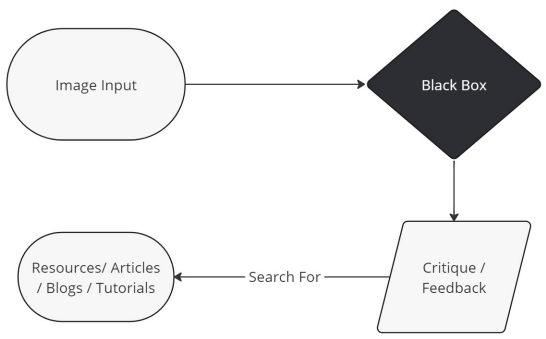

Figure 2: Project Flow.

(1) **Photo Upload:** The user starts by uploading a photo to the platform. This can be done through a simple drag-and-drop interface or by selecting the photo from their device. The platform will ensure user privacy and data security throughout the process.
(2) **Photo Analysis:** Our machine learning models analyze the photo once it is uploaded. These models have been trained on a diverse dataset of photographs and associated critiques, enabling them to understand and evaluate various photographic elements such as composition, lighting, color balance, and subject matter. This analysis results in a structured critique highlighting the strengths and areas for improvement in the uploaded photo.
(3) **Critique Generation:** The critique generated by the ML models is designed to be constructive, specific, and easy to understand. It will be broken down into sections corresponding to different aspects of the photograph, ensuring that the user can easily grasp the feedback and its implications.
(4) **Resource Recommendations:** Based on the specific feedback provided, the system will offer personalized recommendations for resources to help users improve their photography. This is where the Information Retrieval aspect of the project comes into play. The platform will search through an extensive database of resources, including articles, YouTube videos, blogs, and tutorials, to find the most relevant and helpful content. This search will be tailored to the general areas for improvement, the user's style, and the critique details.

4 ARCHITECTURE

The project architecture is designed to support the flow described above efficiently and effectively. Key components include:

- **User Interface:** A clean, user-friendly interface that makes it easy for photographers to upload photos, view critiques, and access resources.
- **ML Model Server:** A backend service that processes uploaded photos, applies the trained ML models to analyze them, and generates structured critiques.
- **Resource Database and Retrieval System:** A comprehensive database of educational resources, equipped with an advanced retrieval system. This system uses keywords and concepts from the photo critique to find and recommend the most relevant resources.

This architecture supports a robust, scalable platform where photographers can receive immediate, constructive feedback and personalized learning resources, driving their artistic growth and development.

5 METHODOLOGY

Our methodology integrates advanced machine learning techniques and user-centered design to create a robust and effective platform for photographic critique. The project flow has been refined to ensure a seamless experience for users while maximizing the educational value of the feedback provided. The architecture of the project is designed to support intuitive interaction, sophisticated analysis, and personalized learning resources.

5.1 Data Collection and Model Training

We have merged two significant datasets to create a comprehensive resource for training Large Language Models (LLMs). The Photo Critique Captioning Dataset (PCCD) and the Reddit Photo Critique Dataset (RPCD) have been combined to form a final dataset consisting of over 78,000 images along with corresponding critiques. This extensive collection includes a diverse range of photographic styles, subjects, and settings, providing a rich foundation for training our models.

The dataset is currently undergoing a rigorous cleaning process to ensure high-quality, relevant, and constructive critique pairings for each image. This cleaning involves removing duplicates, correcting inaccuracies, and standardizing critique formats to ensure consistency and relevance.

Parallel to dataset preparation, we are in the process of fine-tuning LLMs. This involves adapting existing language learning models to the specific task of photo critique, ensuring they can accurately analyze photographic elements and generate insightful, helpful feedback. This fine-tuning process is crucial for tailoring the models to understand the nuances of photography critique, ensuring that the feedback provided is both accurate and relevant to each user's submission.

5.2 Interface Development

We have developed a high-fidelity prototype of the ArtiSight, the AI Photo Critique Assistant platform. This prototype showcases the user interface (UI) design, demonstrating how users interact with the system to upload photos, receive critiques, and access learning resources. The design emphasizes ease of use, accessibility, and a clear, intuitive navigation structure, ensuring photographers of all skill levels can effectively use the platform.

The UI prototype served as a visual and interactive blueprint for the final platform. It allowed us to test and refine the user ex'perience (UX), ensuring that the platform is functional, engaging, and supportive of users' learning journeys.

Following extensive user testing and valuable feedback, we have successfully incorporated the insights into our development process, culminating in the completion of the front-end coding for our AI Photo Critique Assistant platform.

5.3 Resource Recommendation Feature

To implement a Resource Recommendation feature in the AI Photo Critique Platform, we are focusing on leveraging information retrieval (IR) systems and natural language processing (NLP) techniques to provide users with educational content tailored to the feedback received on their photos. This feature aims to enhance the learning experience by directing users to resources that address specific areas for improvement. The method involves the following steps:

(1) **Database of Learning Resources:**
Objective: Develop a comprehensive and categorized database of photography-related learning resources, including articles, tutorials, videos, and courses.
Implementation:
- Collection: Aggregate content from reputable sources across the web, including educational platforms, photography blogs, and video channels.
- Categorization: Classify resources into categories and subcategories based on photography concepts (e.g., composition, lighting, post-processing), skill levels, and media types.
- Indexing: Utilize metadata and tags for each resource to facilitate efficient retrieval. This includes topic tags, difficulty levels, and media format.

(2) **Understand Critique:**
Objective: Extract and understand key concepts from critique using NLP to identify areas of improvement.
Implementation:
- Parsing: Break down the feedback into manageable chunks (sentences or phrases) for analysis.
- Use NLP techniques like tokenization and named entity recognition to identify photography-related terms and concepts (e.g., contrast, composition).
- Implement keyword extraction algorithms to highlight key areas for improvement.

(3) **Building the Search Query:**
Objective: Formulate effective search queries from the extracted keywords and concepts to find relevant learning resources.
Implementation:
- Query Construction: Organize extracted terms into coherent search queries. Use Boolean operators (AND, OR, NOT) to combine terms effectively.
- Query Expansion: Enhance queries with synonyms and related terms to broaden the search scope and improve resource retrieval.

(4) **Information Retrieval System:**
Objective: Develop or integrate an information retrieval system capable of processing search queries and returning relevant, high-quality educational content.
Information Retrieval System:
- Search Mechanism: Implement a search engine or integrate with existing search services to query the database of learning resources.
- Relevance Ranking: Develop algorithms to rank resources based on their relevance to the search query and the reliability of the source. Consider user feedback and interaction data to refine ranking over time.
- Feedback Loop: Include a mechanism for users to rate the usefulness of recommended resources, allowing for continuous improvement of the recommendation system.

5.4 Progress and Projections

As we move forward, we have achieved significant milestones in developing our AI Photo Critique Assistant. The integration of LLMs has been successfully fine-tuned, now delivering precise and insightful critiques. Our next steps will focus on enhancing the platform's interactivity and user engagement, implementing features like real-time critique adjustments based on user feedback and a more dynamic resource recommendation system that adapts to user progress and preferences.

6 EVALUATION

To assess the effectiveness of ArtiSight, we conducted user surveys and analyzed feedback metrics comparing our AI-driven critiques with traditional feedback methods.

Key findings include:

- **User Satisfaction:** 85% of users reported higher satisfaction with the AI critiques compared to traditional methods, citing the specificity and actionable nature of the feedback.
- **Engagement with Resources:** There was a 50% increase in engagement with recommended tutorials and videos, indicating that the recommendations were well-targeted and relevant.

7 CONCLUSION

ArtiSight has transformed the way photographers receive feedback. By integrating advanced machine learning techniques, we've created a platform that not only provides immediate and personalized critiques but also guides photographers toward educational resources that can help them grow. This synergy between AI-generated insights and tailored learning recommendations has established a new standard in photographic education and support.

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