SPAM

Next-Generation Smart Photo Album

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1.1. Basic Features

Basic Features

- **Effortless Photo Management**
  Organize your photos seamlessly by time, location, and custom tags. Easily browse and retrieve memories with structured categorization.
- **Advanced Search Capabilities**
  Instantly find your photos based on content, date, location, or tags. Use AI-powered search to recognize faces, objects, and scenes within your photos.
- **Built-in Photo Editing Tools**
  Enhance your photos with powerful editing tools, including cropping, filters, adjustments, and retouching options—all within the app.

Basic Features (Cont.)

- **Memory Timeline & Video Generation**
  Relive special moments with automatically generated memory timelines.
  The system can create video highlights using your best photos and clips.
- **Seamless Social Sharing & Collaboration**
  Share your favorite moments effortlessly with family and friends.
  Collaborate on shared albums, comment on photos, and react with emojis.

1. Requirement Analysis

1.2. Non-Functional Features

Non-Functional Features

- **Usability**
  The application offers an intuitive, multilingual, and accessible interface with responsive design for seamless use across devices.
- **Performance**
  Ensures fast response times, scalability, and efficient caching for handling large albums and high user concurrency.
- **Security**
  Implements robust authentication, role-based access control, and encryption to protect user data and ensure secure access.

Non-Functional Features (Cont.)

- **Safety & Privacy**
  Complies with data protection regulations, provides data deletion options, and ensures secure handling of sensitive information.
- **Maintainability**
  Features modular code, comprehensive documentation, automated testing, and CI/CD pipelines for easy maintenance and updates.

1. Requirement Analysis

1.3. Data Requirements

Data to be Collected and Managed

Photo files: Formats: JPG, PNG, HEIC, etc.

Metadata: EXIF data: Timestamp, Geolocation, Camera/device info

User data: Tags: events, people, places; Albums: names, descriptions; Sharing: public/private/collaborative

AI-generated tags: Facial recognition, Object/scene detection

Edited content: Modified images: crops, filters; Generated videos: moments, timelines

How to Collect and Process Data

- **Image Metadata Extraction**
  Automatically extract EXIF data using libraries (e.g., ExifTool, Python Pillow).
- **AI Tagging & Classification**
  Use OpenCV and GPT (or other AI/ML services) for face recognition, object detection, and tagging.
- **Photo Editing Metadata**
  Implement edit history and version control to enable rollbacks or undo changes.
- **Search Indexes**
  Build search indexes in databases (e.g., ElasticSearch) to enable fast retrieval based on time, location, people, objects, and tags.

Data Storage

- Use **MINIO** for object storage (photos, videos).
- Use **MySQL/PostgreSQL** for relational data (user accounts, tags, album relationships).
- **Backup and disaster recovery plans** to protect user data.

1. Requirement Analysis

1.4. Technical Requirements

Operating Environment

Category	Technologies/Tools
Frontend	React.js, TailwindCSS/Bootstrap
Backend	Java (Sprint Boot), Python (FastAPI/Django)
Database	MySQL/PostgreSQL, MINIO
AI/ML Services	OpenCV, GPT, Third-party APIs (Remove.bg, DeepAI)
Video Generation	MoviePy, FFmpeg
Authentication	OAuth 2.0, JWT, HTTPS
Deployment	Docker, Kubernetes, Ali Cloud/On-premise

2. Task & Plan

2. Task & Plan

2.1. Task Decomposition

User Stories

- Photo Management
  - Manage photos by time, location, event, or tags.
  - Automatically create albums based on photo characteristics.
- Photo Editing
  - Crop, rotate, and adjust brightness/contrast.
  - Remove unwanted objects to improve photo quality.
- Advanced Search
  - Search by date, location, tags.
  - Search by image content (face/object recognition).
- Moment Video & Timeline
  - Automatically generate highlight videos with music.
  - View photos in chronological order.
- Sharing & Social
  - Share photos/albums on social media or with friends.
  - Create collaborative albums for team/family.

Tasks

- Photo Management
  - Design database tables (photos, albums, tags).
  - Implement photo upload & storage.
  - Categorize albums by time & location.
- Advanced Search
  - Implement search by time & location.
  - Research image search API.
  - Design search UI/UX.
- Photo Editing
  - Add crop & rotate features.
  - Investigate image processing libraries (OpenCV, Pillow).
- Sharing & Social
  - Design access control for shared albums.
  - Implement social sharing links.

2. Task & Plan

2.2. Plan

Task Assignment

- Frontend
  - **Zhang, Zhanwei**: Frontend pages for photo/video and memory timeline generation.
  - **Zhou, Yixian**: Frontend pages for image editing.
  - **Zhang, Shuwei**: Frontend pages for image management (create, read, update, delete).
- Backend
  - **Gao, Ziran**: Image storage, authentication, user login (frontend & backend), photo editing tools.
  - **Liu, Shengding**: Tagging, advanced search, photo/video and memory timeline generation (backend).

Project Timeline

- **Week 5**: Requirements Analysis, Database Design, Basic UI Design
- **Week 6**: Photo upload function, Search function, Basic photo editing function
- **Week 7**: Collaborative Albums & Social Sharing, Testing & Debugging
- **Week 8**: Sprint 1 is over, Ready for presentation

Thank You!