Assignment for Week 04 / Sprint 02

– Risk Analysis & Feasibility Report

Team Information

• Team Name: Byte On
• Project Title: Doodle DJ
•Team Members and Roles:

- Atharva Swami: Team Lead
- Sneh Shah: Machine Learning Engineer
- Ravneet Kaur: Backend Developer
- Ishita Mehta: Backend Developer
- Harsh Chheda: Front End Developer
- Rishabh Budhia: Front End Developer
- Anannya Patra: UI/UX Designer
- Sai Varnitha Reddy: UI/UX Designer
- Shalin Shah: Machine Learning Engineer

Risk Analysis

Risk Identification:

Risk Identification List at least 3-5 major risks your team may encounter. Risks can be technical, operational, team-related, or external.

Risk ID	Description	Team	Impact (High/Med/Low)	Likelihood (High/Med/Low)	Mitigation Strategy
R1	Real-time Canvas Performance	Frontend	High	High	Implement efficient drawing algorithms, use canvas optimization techniques, leverage browser caching
R2	UI Component Rendering Performance	Frontend	Medium	High	Optimize React component lifecycle, implement code splitting, minimize re-renders
R3	State Management Complexity	Frontend	High	Medium	Implement proper state management architecture, use React hooks effectively, and maintain a clean component hierarchy
R4	User Interface Responsiveness	Frontend	Medium	Medium	Use responsive design principles, implement a mobile-first approach, and optimize for different screen sizes
R5	Insufficient training data for algorithms that detect mood.	ML	High	Medium	Acquire extra datasets and apply data augmentation methods.
R6	Overfitting of	ML	High	High	Utilize

	machine learning models				cross-validation regularization techniques and track the performance of the model
R7	Integration difficulties between ML models and backed and then backend with frontend	ML	Medium	High	Define explicit API agreements at the beginning and implement ongoing integration testing.
R8	Real-time mood detection will be conducted.	ML	High	Medium	Enhance model algorithms and utilize efficient computing resources.
R9	Adherence to data privacy and security standards.	ML	High	Medium	Utilize robust encryption methods and ensure compliance with GDPR or equivalent standards.
R10	Mismatch of training data	ML	High	High	Develop feature extraction techniques to detect mood from minimal image elements, using transfer learning for model adaptation and real-time feedback to enhance accuracy.
R11	Lack of Ease of User Interface	UI/UX	High	Medium	Perform usability testing, prioritize intuitive design patterns, and apply user-centered design principles.
R12	Insufficient User Research	UI/UX	High	Medium	Conduct user interviews, surveys, and usability testing early to ensure user needs are understood.

R13	Misalignment Between Design and Development	UI/UX	High	Low	Use design systems and regular check-ins to ensure consistent implementation.
R14	Changing Client Requirements Mid-Design Phase	UI/UX	Medium	Medium	Use Agile methodology to remain flexible and accommodate changes efficiently.
R15	Cognitive Overload Due to Complex UI	UI/UX	High	Medium	Simplify UI, reduce unnecessary elements, and focus on progressive disclosure to avoid overwhelming users.
R16	API Dependencies (Spotify Integration)	Backend	High	Medium	Maintain fallback mechanisms for critical functions, implement robust error handling, regular monitoring of API updates
R17	Data Privacy and Security	Backend	High	Medium	Ensure proper authentication and authorization. Use secure login methods and verify user permissions before granting access to sensitive data.
R18	Performance Bottlenecks	Backend	High	Medium	Implement caching strategies, optimize database performance, conduct regular load testing
R19	Database Integrity & Reliability: If the backend database is not structured efficiently, it may	Backend	High	Medium	Implement proper data schema design, ensure regular database backups, and use validation techniques to prevent

	lead to inconsistent or lost data (e.g., user interactions, mood detection results).				incorrect or incomplete data from being stored.
R20	Integration Challenges	Backend	High	Medium	Maintain clear API documentation, implement regular integration testing, and use a staged deployment process.

Risk Prioritization & Response Strategy:

The team will prioritize risks based on their impact on core functionality and likelihood of occurrence, ensuring that critical issues are addressed first.

Critical Risks (Immediate Action Required)

- Real-time Canvas Performance (Frontend): Optimizing drawing algorithms and caching to ensure a smooth user experience.
- Overfitting of ML Models (ML Team): Applying cross-validation and regularization techniques to improve generalization.
- Integration Challenges (Backend & ML Team): Establish clear API contracts and conduct continuous integration testing.
- Performance Bottlenecks (Backend): Optimizing API response times and caching to prevent delays.
- State Management Complexity (Frontend): Using React Hooks/Redux for efficient state handling.
- Cognitive Overload (UI/UX Team): Simplifying UI design with progressive disclosure.
- API Dependencies (Backend): Implementing fallback mechanisms for external API reliance.

Medium Risks (Ongoing Monitoring & Mitigation)

- UI Rendering Performance (Frontend): Minimizing re-renders and optimizing component lifecycles.
- Insufficient Training Data (ML Team): Expanding datasets and using data augmentation.
- Real-time Mood Detection Accuracy (ML Team): Refining algorithms and leveraging real-time feedback.
- Database Integrity (Backend): Ensuring structured schema design and regular backups.
- UI/UX Usability Issues: Conducting early usability testing to ensure an intuitive interface.

Lower Risks (Address as Needed)

- Changing Client Requirements (UI/UX Team): Using Agile methodology to accommodate changes.
- Design-Development Misalignment: Ensuring consistency through regular check-ins.

Monitoring & Adaptation Strategy

The team will conduct bi-weekly risk reviews, track key performance metrics, and hold integration checkpoints each sprint. Risks will be reassessed dynamically, escalating any emerging issues to maintain project stability.

Feasibility Analysis

Technical Feasibility:

Doodle DJ is technically feasible within the team's expertise and available resources, though key challenges include real-time performance optimization, seamless integration between components, and maintaining an intuitive user experience. The team can effectively address these challenges by leveraging appropriate technologies, structured workflows, and continuous testing.

The frontend team must implement a responsive, real-time drawing canvas while ensuring smooth mood data capture. React.js and HTML5 Canvas will be used, with libraries like html2canvas aiding performance. Gaps in expertise will be bridged through developer documentation and systematic cross-device testing. The backend team must enable low-latency communication between the frontend and ML models, ensuring efficient request handling with FastAPI and MongoDB. The team is proficient in Python but will utilize community support and iterative testing to refine performance. The ML team faces challenges in developing accurate mood detection algorithms that integrate seamlessly with the system. Using TensorFlow, PyTorch, and Scikit-learn, they will optimize model performance through data augmentation and cross-validation. The UI/UX team must ensure smooth, responsive canvas interactions, relying on early usability testing and iterative design improvements with Balsamiq and Adobe Illustrator.

With well-defined goals, appropriate technology choices, and a structured development approach, Doodle DJ remains achievable within time and resource constraints. Continuous testing and proactive problem-solving will ensure a successful implementation.

Time & Resource Feasibility:

The Doodle DJ team has structured a realistic timeline for MVP delivery, balancing workload across frontend, backend, ML, and design teams. The frontend team will complete canvas implementation in early sprints, integrate real-time features and APIs mid-cycle, and focus on optimization in later stages, using tools like GitHub, VS Code, Vercel, and Jest. The ML team will follow a phased approach, beginning with data collection and baseline model development, progressing to API integration and model refinement, leveraging TensorFlow and PyTorch on AWS or Google Cloud. Both teams will manage workload through agile methodologies, dedicating 15-20 hours per week while maintaining flexibility.

The design team will complete UI/UX research, prototyping, and wireframing within five sprints, ensuring smooth collaboration with developers using Balsamiq Wireframe and Adobe Illustrator. Post-completion of the design tasks, the design team will take on writing test cases for the TDD approach, UI testing, and deployment(CI/CD) to ensure smooth execution of the website. Meanwhile, the backend team will prioritize API development, real-time data handling, and database structuring with MongoDB, FastAPI, and Firebase authentication, using ClickUp for task management and GitHub for version control. If additional third-party services like AWS S3 are needed, they will be integrated incrementally. With this structured sprint plan, well-defined roles, and efficient tool usage, the project is feasible within time and resource constraints.

Market Feasibility (Optional Bonus Section - Extra Credit):

- **Who are your potential users?**
  DoodleDJ targets digital artists, illustrators, and creative professionals who rely on music to enhance their workflow, as well as hobbyist artists and music enthusiasts who seek a seamless blend of music and art. The estimated market size includes 200M+ digital artists, 100M+ creative professionals, 500M+ hobbyist artists, and 500M+ active music streaming users globally.
- **Is there a demand for your solution?**
  The digital art market is expanding rapidly and is projected to grow from $2.1B in 2021 to $5.1B by 2026 (Coherent Market Insights). Simultaneously, music streaming continues to surge, with 589M paid subscribers globally in 2022 (MIDiA Research). Research highlights that 82% of artists acknowledge music's impact on creativity, while 73% desire better integration between creative tools and music. DoodleDJ directly addresses this gap with AI-driven, real-time music adaptation based on artwork.
- **What competitive solutions already exist?**
  Existing platforms like Spotify and digital drawing apps lack direct integration, requiring manual playlist management. Productivity-focused apps (e.g., Brain.fm) enhance focus but do not support artistic workflows. While digital art tools like Adobe Fresco and Krita offer sound features, they lack dynamic AI-driven music curation. DoodleDJ is the first platform to offer real-time, AI-powered music-art integration, filling a key market gap with strong growth potential (Coherent Market Insights, MIDiA Research).

References:

Coherent Market Insights:
https://www.coherentmarketinsights.com/industry-reports/digital-artwork-market#:~:text=The%20Digital%20Artwork%20Market%20size,digital%20forms%20using%20digital%20technology.

MIDiA Research:
https://www.midiaresearch.com/blog/music-subscriber-market-shares-q2-2021

Conclusion & Next Steps

The feasibility analysis confirms that Doodle DJ is achievable with the current team and technology stack. However, key challenges include real-time performance optimization, seamless integration between components, and ensuring data reliability across the system. Addressing these risks early through structured workflows and proactive testing will be crucial for project success.

Across all teams, prioritizing efficient API communication, optimizing system performance, and maintaining structured data management will be essential. The frontend team will focus on real-time canvas rendering and state management, the backend team will optimize API efficiency and database reliability, and the machine learning team will enhance model performance and real-time inference.

Immediate Next Steps for All Teams:

- Frontend Team: Finalize the drawing canvas prototype, implement basic tools, and begin API integration.
- Backend Team: Develop and document API endpoints, optimize database schema, and conduct load testing.
- Machine Learning Team: Enhance data collection, train models with cross-validation, and integrate ML models with backend APIs.
- UI/UX Team: Finalize website design prototype and create detailed wireframes to streamline development.

By maintaining collaborative development, continuous testing, and adaptive risk management, the team is well-positioned to successfully deliver Doodle DJ with a smooth and interactive user experience.

Team Sign-Off

By signing below, all team members acknowledge that they contributed to this report.

Name: Atharva Swami   Signature: AS
Name: Sneh Shah   Signature: SS
Name: Ravneet Kaur   Signature: RK
Name: Ishita Mehta Signature: IM
Name: Harsh Chheda   Signature: HC
Name: Rishabh Budhia   Signature: RB
Name: Anannya Patra Signature: AP
Name: Sai Varnitha Reddy Signature: SVR
Name: Shalin Shah   Signature: SS

Note: The sentences in this document were reviewed and rewritten using ChatGPT to ensure they are clear, concise, and free of grammatical errors.