SoDA: A Mobile Dance Application

Project Proposal

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1 PROJECT DESCRIPTION

Dance is a performance art form comprising of a sequence of movements to a rhythm or beat. It is a part many cultural heritages and has been done for generations. Dances and dance movements are often taught by one person to another but learning all the movements can be difficult and one cannot remember it all. Over the years, dancers have found ways to record dance movements to recall later, some of these methods include hand-written notes, annotation, like Labanotation and Benesh Movement notation [16], and other digital resources such as dance videos and images [4].

With the growth of technology in society, came its integration with dance and the development of different dance tools. There have been tools developed for annotating dance movements, capturing and analysing movements as well as some archival systems for storing dance movements. From the systems explored, there is a lack of resources purely devoted to annotating, storing and querying multimedia dance content using a mobile application.

This project aims to develop such a mobile application that dancers and users can use to store and annotate dance media content and browse and search dance media content while in a social setting, i.e. at a social dance. The application will allow users to notarize dance media content using an annotation vocabulary based on a dance representational model and will allow them to search it using ontology-based search techniques. It will also give users access to a database of pre-existing multimedia dance content that they can search with the help of query expansion techniques that provide comprehensive search results and speed up of the search process.

2 RELATED WORK

The research conducted aimed to explore the various ways in which existing tools annotated and stored dance media for the purpose of searching and retrieving.

Many dance annotation tools developed a dance representational model to provide users with a dance vocabulary for the annotations being used [5, 6, 8, 13]. The dance representational models were developed in collaboration with dance experts and by using generic movement terminology. Each annotation tool developed a different representational model for dance concepts. BalOnSe [6] uses a Ballet ontology, making use of *Generic Movement Concepts* and *Specific Movement Vocabularies,* which refers to generic movement descriptors not specific to dance concepts and movements specific to the ballet genre respectively. The WML system [5] defines dance movements using generic movement descriptors only, which is further categorized into *Action, Movement Principle* and *Movement Quality.* Alternatively, the DMAR [13] and DVCM [12] dance annotation tools conceptualize dance concepts into events and objects partaking in events. In each case the dance annotation tools do not conform to a standard dance model. However, the dance representational models provide a vocabulary for annotations and allow users to add metadata to the dance media objects through the annotations. Subsequently, the addition of annotations to dance media make it searchable.

The dance concepts are further represented within an ontology, which is a domain specific representational model, organizing concepts within a taxonomy [6, 8, 9, 13]. These dance ontologies are further used to improve the search technique implemented within these tools by retrieving dance media objects that are more relevant to user queries. Dance annotation tools each allow users to query content differently. Types of queries include the categorization of dance media objects based on dance genre, as in the case of WML [5], BalOnSe [6], DanVideo [8], DVCM [12] and DMAR [13], and free-text queries, which is implemented by DMAR, BalOnSe, DVCM and DanVideo. From the previous statement, it is observed that dance annotation tools can process both types of queries. A novel example of the use of ontologies to improve search is the TDAT annotation tool [9]. TDAT takes an ontology as input, allowing various types of dance genre concepts to be extracted and used for contextual search and retrieval within the system. This novel approach allows the tool to utilize genre specific vocabularies for the planned use of the annotation system.

In exploring the literature on multimedia databases, we established current methods of reviewing multimedia data used by dancers and explored how existing dance systems managed, stored and queried multimedia data.

Current methods of searching and viewing multimedia data involve utilizing mobile device resources. Dancers can record videos and capture images, and store that data using the gallery application native to most mobile devices [14]. Users can browse their media and store their data in files for better organization. Users also search for videos on YouTube, a popular video-sharing application [1]. YouTube's search function allows users to search videos using keywords or using free text. They can search videos based on information such as uploaders name, the video name or the context. The YouTube search function also provides a 'related videos' search result which inspired one the query expansion techniques we intend to implement.

There are several existing dance systems that utilize some form of database to store multimedia data. The WholoDancE movement library [5], BalOnSe [6] and Balinese Preservation System [15] all utilize some open-source relational database management system. Those database systems are PostgreSQL, H2 Database and MySQL respectively.

3 PROBLEM STATEMENT

3.1 Problem

The project focuses on the problem of the searchability of dance media content within a database, specifically for Latin dance, such as Salsa, Bachata, Kizomba and many more, on a mobile platform. Due to the semantics and humanistic aspect of dance and different dance genres, there has been no standard dance framework developed that can be used for all dance types. From the systems explored, there is a lack of resources purely devoted to annotating, storing and querying multimedia dance content using a mobile application. These existing tools use their own dance representational models that provide a controlled vocabulary for annotations, however, none of these models cater to Latin dance movements. Therefore, annotation and querying of specific Latin dance content is a problem as the lack of dance vocabulary limits the searchability of dance content within a database. This issue is made worse by the lack of querying techniques used to retrieve accurate data from databases which is a feature lacking in many existing dance systems.

3.2 Aim of Project

The aim of this project is to develop a mobile dance application that documents Latin dance based on user annotations and allows users to search dance content. It is intended for dancers or users of the application to be able to retrieve dance content enabling a recall in order to perform the dance move retrieved, through searching annotations and other keywords with the help of query expansion techniques.

3.3 Requirements

The following are requirements of the system to solve the problem of the searchability of dance media content.

Functional requirements:

- Application should provide user-friendly interface
- Should allow user to upload and annotate dance media content
- Should allow user to query their media data through annotation
- Should allow user to query inherent database
- Database should store and retrieve multimedia content

Non-functional requirements:

- Application should implement two or more query expansion techniques
- Use dance representational model to provide a vocabulary for dance annotations

4 PROCEDURES & METHODS

The SoDa system will comprise of two components, i.e. a Dance Annotation Tool (figure 1) and a Dance Archival System (figure 2). The colours orange and purple indicate that each of these components will be developed by a different person respectively.

The Dance Annotation Tool requires a Latin Dance Schema to be developed for use in searching dance media files stored by users with the annotations. The annotations are done using keywords from a controlled dance vocabulary. This vocabulary is extracted from the dance schema. Users will interact with the tool through an interactive user interface.

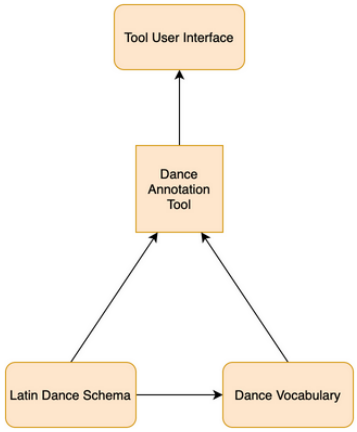

Figure 1: System architecture diagram of Dance Annotation Tool

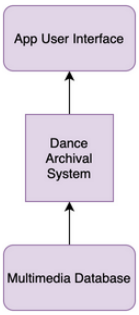

Figure 2: System architecture diagram of Dance Archival System

4.1 Work Allocation

Kouthar will be responsible for the design and development of the dance annotation tool. A conceptual dance model will be developed to provide a controlled vocabulary for annotations and to use it for the search and retrieval of dance media content through a search engine.

Carryn will be responsible for the design and development of the multimedia database as well as the development of the archival system component i.e. the interface and search engine. This will include the implementation of query expansion techniques.

4.2 Dance Annotation Tool

The purpose of the dance annotation tool is to provide users with a tool that allows them to annotate dance media objects using a controlled dance vocabulary. The annotations of the media files will be used as metadata to search the dance content contained within the files. By annotating these dance media objects it will allow the system to be able to retrieve media objects from storage. The tool will use a conceptual schema of dance for retrieving objects based on a search query.

4.2.1 Dance Annotation: The tool will allow users to annotate dance media objects using the controlled vocabulary of the system. The controlled vocabulary will be extracted from a conceptual dance schema, specific to Latin dance, that will be developed. Crowdsourcing will be used as a method for analysing how dancers would annotate dance media files, and through this process we would be able to identify the most effective way of annotating dance and the common dance concepts identified. Additionally, natural language processors can be used to analyse articles and syllabi related to Latin dance and extract the most common dance concepts identified within these articles and syllabi descriptions. Together, the results from the crowdsourcing and natural language processors will help to develop a high-level conceptual dance schema for Latin dances.

4.2.2 Querying Dance Media Content: Once the dance media files have been annotated, users are able to search the media files for specific dance content through a search engine. The search engine will allow users to enter a free-text query, from which the tool will extract key concepts, which is used to search dance media files. These key concepts extracted from the query will be used with a Vector Space Model for retrieving the dance media files from storage. This dance schema will be used to retrieve dance media files based on keywords relating to the schema and the query, to provide more contextually relevant search results.

4.3 Dance Archival System

The dance archival system will consist of stored multimedia dance content, specifically Latin dance content. Dancers and users will be able to query this content with the help of a search engine and will be able to view all the available data in a user-friendly interface.

4.3.1 Multimedia Database: A fundamental component of the archival system is the multimedia database. The database design will therefore be the first step in the development process. Because of the unstructured nature of the multimedia data, a NoSQL, document-oriented database will be used. MongoDB is the proposed platform we will be using for the database development.

4.3.2 Search Engine: The search engine will form part of the dance application interface which will be developed using a mobile SDK. Basic query functions from this interface is proposed to be completed for feasibility demonstration. Query expansion techniques will be implemented in the final engine to provide a more comprehensive search engine. Some of the query expansion techniques that may be implemented include interactive query refinement, relevance feedback and automatic query expansion through search log and linguistic analysis [3]. It may be necessary to utilize WordNet, a lexical database of English, for linguistic analysis of queries [7] for some of these query expansion techniques.

4.4 Development Practices, Methods & Tools

The SoDa system will be developed using iterative methodologies, where the system is developed in increments and functionalities are developed and implemented one at a time. Firstly, a predefined, lightweight dance representational model will be decided upon for use within the system, which is followed by the development of the dance annotation tool and dance archival system concurrently. Lastly, the two components will be integrated to form a complete system presenting to users a dance notebook application where they are able to annotate dance movements and search dance content within the system. The mobile application will be developed using Flutter, which is a Google opensource mobile application SDK.

4.5 Evaluation of System

Once an advanced system prototype is developed we will evaluate it and based on the feedback from evaluations the prototype will iteratively be adjusted and improved. The prototype will be evaluated by the development team conducting a Cognitive Walkthrough, where the user's problem is simulated and the system is used to solve this problem [10]. Within the Cognitive Walkthrough each team member will be required to complete a list of tasks that users will typically complete. Generally, the tasks will relate to the annotation of dance content within a media file and the retrieval thereof. The Cognitive Walkthrough will measure quantitative and qualitative data. The quantitative measures will pertain to the task completion and success rate and the number of errors encountered during the Cognitive Walkthrough. The qualitative measures will address questions such as whether users will know what to do when completing tasks, will users know the correct sequence of actions to take to complete tasks and will they interpret the system dialogue correctly. As a result of these questions, evaluators (Computer Science Honour's Students) will record what problems users will encounter and the reason for it. The usability of the system will be assessed through a heuristic evaluation, during which the compliance of the system design with the usability heuristics defined by Nielsen [10] and the severity rating of non-compliance is recorded. After which the team debriefs where they discuss major issues highlighted and suggest solutions.

Since the dance annotation tool and archival system will utilize different search techniques we will test the effectiveness thereof by comparing it to a prevalent search technique, i.e. keyword-based search technique. The effectiveness of these information retrieval techniques will be measured by recall and precision. The following formulae will be used to calculate recall and precision respectively:

$$Recall = \frac{Number\ of\ relevant\ objects\ retrieved}{Number\ of\ relevant\ objects}$$

$$Precision = \frac{Number\ of\ relevant\ objects\ retrieved}{Number\ of\ retrieved\ objects}$$

From the above formulae, recall is the percentage of relevant objects retrieved as a result of the total relevant objects, whereas precision is the percentage of relevant objects retrieved of the total retrieved objects as a result. The types of queries that will be used within this test will include generic queries, specific/narrow queries and context-based queries. These queries will be computed using both an ontology-based search technique and a keyword-based technique. The average of the recall and precision results will be compared to exhibit the effectiveness of each search technique.

4.6 Design Challenges

The design and development of the SoDa system will bring up many challenges. One of the challenges is the development of the dance schema as it requires feedback and participation of dance experts through the crowdsourcing process. The evaluation of the effectiveness of search techniques implemented within the search engines will be a challenge. Usability testing will, also, be limited to heuristic evaluations done by developers only as there is no possibility of target users participating in development. Furthermore, the integration between the two components of the completed system is of concern as the search engines implemented within each component will search different parts of the database and use different search techniques.

The following challenges will relate to the completion of the project in general:

- Collaborating with dance expert to develop the dance ontology
- Usage of an understandable dance dialogue within the annotation process
- Implementation of a search engine that correctly utilizes an ontology for processing queries
- Integration of dance annotation tool and dance archival system components
- Designing a database schema to incorporate both the annotation tool and archival system components
- Correctly implementing the search techniques
- Accurately evaluating the effectiveness of the search techniques
- Obtaining results that effectively measure the usability of the system
- Following the project plan for the development process
- Meeting project deadlines setup by the Computer Science Honours Department.

5. ETHICAL, PROFESSIONAL & LEGAL ISSUES

For this project, we will perform crowdsourcing to develop a gold standard vocabulary for the annotation system. This will require ethical clearance from UCT Faculty of Science Research Ethics Committee. If necessary, we will get assistance from dance expert, Angus Prince, with respect to the dance schema and acquiring dance media content. We will also require other media data to store in our multimedia database. Given the 'fair use' clause, we can source this content from public sites online without permission from copyright owners.

Evaluations of our software will be performed by the development team. No outside participants will be involved in the evaluation; therefore, no ethical clearance is required for this.

This project is in partial completion of our honour's degree; therefore, we own the intellectual property of this project. All project resources will be open-sourced and made available on GitHub and the UCT Department of Computer Science Honours Project Archive.

6 ANTICIPATED OUTCOMES

6.1 Software System

6.1.1 Dance Annotation Tool Software Features. The annotation tool will form part of a complete local mobile system, which allows users to store, browse and retrieve Latin dance content. The annotation tool is responsible for providing users with the option to upload dance media objects, annotate the dance content within the objects, store it and retrieve it for recall and performance within a social setting. The tool, therefore, provides users with the opportunity to make dance media searchable by providing a system that manages dance content based on the annotations created by users. Also, by the user creating a profile that is connected to the SoDa system it reduces the stress of users losing their dance content if the application is lost or deleted from the user's device. The key features of the dance annotation tool include creating a user profile, upload of media files, i.e. video and image, annotation of media content using the system defined dance vocabulary or user-defined dance vocabulary using free-text and browsing and searching for annotated dance content.

6.1.2 Dance Archival System. The Dance Archival System, the second component of the mobile application, will be a repository of pre-loaded Latin dance multimedia including videos, images and textual descriptions. Unlike like the annotation tool, this data will be public and accessible by all users when the application is downloaded. The system will afford users the ability to browse available multimedia dance data and query the database with a search functionality that will incorporate query expansion techniques. It is anticipated that the query mechanism will provide interactive query refinement, record past queries and provide related search options to provide an accurate and comprehensive search functionality. The other aspect of this system will be the presentation of the multimedia data, this will be incorporated in the user interface design of the application.

6.2 Expected Impact

The expected results will differ for each component of the SoDa system. The general result that we expect from developing this system is to provide dancers and choreographers with a tool that allows them to store and search dance media.

6.2.1 Dance Annotation Tool. The aim of developing the dance annotation tool is to provide dancers and choreographers with a tool that allows them to notarize dance media content through the utilization of annotations, making it searchable. The impact that this tool is expected to have is to provide dancers and choreographers with a user-friendly notebook to record and search their customized dance media content. To add to the user-friendliness and customizability of the annotations, the tool includes the option of annotating media objects using free text. Essentially, this is a user-defined annotation. By developing this tool, we hope to assist in providing dancers and choreographers with an easier method for recording and searching their dance content on their mobile device for recall, leading to the production of the dance move/s queried.

6.2.2 Dance Archival System Expected Impact. The purpose for this system is for users to be able to browse available multimedia dance resources without the need to upload their own data or provide their own annotations. There are two main impacts we expect from the implementation of the archival system. The first impact is that users and dancers will be able to search for data without having extensive knowledge on dance terminology or on the metadata of the available resources in the database. The second impact is that the implementation of query expansion techniques will improve the quality of the searches performed thus allowing users to find the data they need faster.

6.3 Success Factors

The key success of the SoDa system will be measured for each component of the system, i.e. dance annotation tool and dance archival system. These success factors will be assessed through the Cognitive Walkthroughs and Heuristic Evaluations, mentioned in section 4.5, by obtaining feedback from these evaluations.

6.3.1 Dance Annotation Tool. The success of the annotation tool will be determined by ensuring that all the requirements have been met and the features of the tool work, i.e. upload of dance files, annotation of dance files and search of dance files. Subsequently, to ensure that the lightweight conceptual dance schema works for searching, we would test how accurate it is in retrieving desired results by using the precision and recall model, as mentioned in section 4.5.

6.3.2 Dance Archival System. The factors that will determine the success of the archival system can be split into development factors and usability factors. From a development perspective, the project will be deemed successful if the database is successfully created to store, view and query different multimedia data, and if the query expansion techniques are correctly implemented. The precision and recall model, mentioned in section 4.5, will be used to determine the accuracy and effectiveness of the query expansion. The usability success will be dependant on the results of the task completion and heuristic evaluation.

7 PROJECT PLAN

7.1 Risks and Risk Management Strategies

The risks associated with the proceeding of this project, and its associated management strategies, are outlined in Appendix A below.

7.2 Project Timeline and Milestones

The timeline for this project is shown by means of a Gantt chart which can be seen in Appendix B. The chart shows a breakdown of the tasks to be completed as well as the upcoming milestones. The upcoming milestones are as follows:

Due Dates	Milestones
4 June 2020	Project Proposal
10 July 2020	Revised Proposal
9 August 2020	Basic Annotation Process Complete
9 August 2020	Database designed and created
10 –14 August 2020	Initial Software Feasibility Demonstration
22 August 2020	Notebook Interface complete and functional
22 August 2020	At least two query expansion techniques implemented
29 August 2020	Completed evaluations
11 September 2020	Final Project Paper Draft Completed and Submitted
21 September 2020	Final Project Paper Completed and Submitted
25 September 2020	Final Project Code Completed and Submitted
5-9 October 2020	Final Project Demonstration
12 October 2020	Poster Completed and Submitted
19 October	Web Page Submission

Table 1: SoDa Project Milestones

7.3 Resources Required

For system requirements to be formulated, research is done into the process of how dancers and/or choreographers notarize dance moves. A development team is then required for the development of each system component, i.e. dance annotation tool and dance archival system. A mobile platform is needed for development and implementation, which will be developed on the team's personal computer/laptops. Furthermore, project documentation tools are required such as MS Office, OneDrive, TeamGantt and GitHub. Lastly, no funding is required for the development, but might be required for crowdsourcing.

7.3 Deliverables

The deliverables for the project are as follows:

Dates	Deliverables
4 June 2020	Project Proposal
10 July 2020	Revised Proposal
10-14 August 2020	Annotation Process and Database for Demonstration
11 September 2020	Final Completed Draft of paper
21 September 2020	Project Paper Final Submission
25 September 2020	Fully integrated mobile application with annotation tool and archival system. (Project Code Final Submission)
5-9 October 2020	Final Project Demonstration
12 October 2020	Poster
19 October	Web Page

Table 2: SoDA Project Deliverables

REFERENCES

[1] Ankur Satyendrakumar Sharma and Mohamed Elidrisi. 2008. Classification of Multi-Media Content (Video's on YouTube) Using Tags and Focal Points, University of Minnesota.

[2] Brooke, J. 1996. SUS-A quick and dirty usability scale. *Usability evaluation in industry*, *189*(194), 4-7.

[3] Carpineto, C. and Romano, G. 2012. A survey of automatic query expansion in information retrieval. ACM Comput. Surv. 44, 1, Article 1 (January 2012), 50 pages

[4] Ciolfi Felice, M., Fdili Alaoui, S. and Mackay, W. E. 2018. Knotation: Exploring and Documenting Choreographic Processes. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*

[5] El Raheb K., Kasomoulis A., Katifori A., Rezkalla M. and Ioannidis Y. 2018. A Web-based system for annotation of dance multimodal recordings by dance practitioners and experts. *Proceedings of the 5th International Conference on Movement and Computing - MOCO '18*. (2018).

[6] El Raheb K., Mailis T., Ryzhikov V., Papapetrou N. and Ioannidis Y. 2017. BalOnSe: Temporal Aspects of Dance Movement and Its Ontological Representation. *The Semantic Web*. (2017), 49-64.

[7] George A. Miller (1995). WordNet: A Lexical Database for English. Communications of the ACM Vol. 38, No. 11: 39-41.

[8] Kannan R., Andres F. and Guetl C. 2009. DanVideo: an MPEG-7 authoring and retrieval system for dance videos. *Multimedia Tools and Applications*. 46, 2-3 (2009), 545-572.

[9] Lagrue S., Chetcuti-Sperandio N., Delorme F., Thi C., Thi D., Tabia K. and Benferhat S. 2019. An Ontology Web Application-based Annotation Tool for Intangible Culture Heritage Dance Videos. *Proceedings of the 1st Workshop on Structuring and Understanding of Multimedia heritAge Contents - SUMAC '19*. (2019).

[10] Nielsen J. 1994. Enhancing the explanatory power of usability heuristics. *Proceedings of the SIGCHI conference on Human factors in computing systems celebrating interdependence - CHI '94*. (1994).

[11] Oya Kalipsiz. 2000. Multimedia databases. In Proceedings of the 2000 IEEE Conference on Information Visualization. An International Conference on Computer Visualization and Graphics, Istanbul, 2000.

[12] Ramadoss B. and Rajkumar K. 2010. Semantic Modelling and Retrieval of Dance Video Annotations. *INFOCOMP Journal of Computer Science 6.1*. (2010), 9-17.

[13] Ramadoss B. and Rajkumar K. 2007. Semi-Automated Annotation and Retrieval of Dance Media Objects. *Cybernetics and Systems*. 38, 4 (2007), 349-379.

[14] Seung-Ho Lim, Seongwoo Lee and Woo Hyun Ahn. 2013. Applications IO profiling and analysis for smart devices. *Journal of Systems Architecture*, 59, 9 (March 2013), 740-747.

[15] Utami Januhari N., Luh Ayu Kartika Yuniastari Sarja N., and Rudita M. 2018. INFORMATION TECHNOLOGY BASED MODEL FOR BALINESE CLASSICAL DANCE PRESERVATION, International Journal of Engineering Technologies and Management Research, 5(11), 71-85

[16] Venable L. and Guest A. 1984. Your Move, A New Approach to the Study of Movement and Dance. *Dance Research Journal*. 16, 2 (1984), 30.

[17] White, R. W. and Marchionini, G. 2007. Examining the effectiveness of real-time query expansion. *Information Processing & Management*, 43, 3 (2007), 685-704.

APPENDIX A

Risk	Probability	Impact	Consequence	Mitigation	Monitoring	Management
Project team member drops out of course	High	Medium	Proposed system being incomplete and work not being delivered according to deadline.	Ensure that work on the project is delegated so that there is minimal dependencies between developing system components and that progress for each component is comprehensively documented.	Ensure that regular team meetings take place to ensure that members are coping with workload and keep track of each members progress.	Communicate and inform project supervisor and ensure that development of system components continue.
Problems arising from integration of system components developed	Medium	Medium	Incomplete and non-functional final system.	Ensure that integration and testing plan is developed and in line with the project milestones.	Keep track of integration and testing results at each milestone of the project.	Implement the system components as two separate tools to be presented for assessment.
Scope of project is too much/little	Medium	High	Supervisor indicates that the requirements have not been met to their standards.	Continuous communication with project supervisor to ensure that requirements are being met.	Keep track of the functional and non-functional requirements included in the system.	Re-evaluate the functionalities included in the system and make additions/removals.
Requirements of project change	High	High	Change in development plan and increasing time pressure.	Adopt an agile development methodology to ensure that development occurs in small increments addressing one requirement at a time.	Record of requirements to be implemented should be updated regularly.	Re-evaluate the requirements and add/remove from the requirements documented.
Solution to project problem does not work	Medium	High	Results in an inoperable system.	Perform comprehensive tests on system at each increment of system developed to highlight issues early in development process.	Monitor development of functionalities.	Re-evaluate the solution to solve the project problem.
Not meeting project deadlines	Medium	High	Incomplete system being delivered at the end of the project.	Ensure that development is continuously in line with project plan.	Keep track of project deliverables and deadlines thereof.	Remove the least necessary requirement from development plan and work to make up for delays.
Unable to collaborate with experts	High	High	Dance representational model will not be developed.	Ensure that consistent communication between experts is ensured at the start of the project.	Track meeting schedules in line with project plan.	Implement a predefined dance representational model.
Develop a dance representational model that is incomprehensible to target users	Medium	High	Annotation process and dialogue will be unclear and no dance vocabulary will be implemented.	Cognitive Walkthroughs after each incremental development.	Note the detail and progress of the dance representational model.	Use a predefined dance representational model and adapt it to the context of the dance genre used within the system.
System developed is complicated for users	Medium	High	System will be unusable by non-experts of the field.	Cognitive Walkthroughs after each incremental development to ensure that usability of system is incorporated into development.	Obtain feedback from system evaluations and supervisor.	Re-evaluate system processes and inform supervisor.
Inexperience of development team to evaluate the usability of system	Medium	Medium	Usability will not be incorporated into the system effectively.	Develop alternative plan of evaluation methods.	Ensure that team members are trained in heuristic evaluations at the start of the project.	Do cognitive walkthroughs to highlight usability issues.

Table 3: Table listing the risks associated with the project and the risk management strategies for each

APPENDIX B

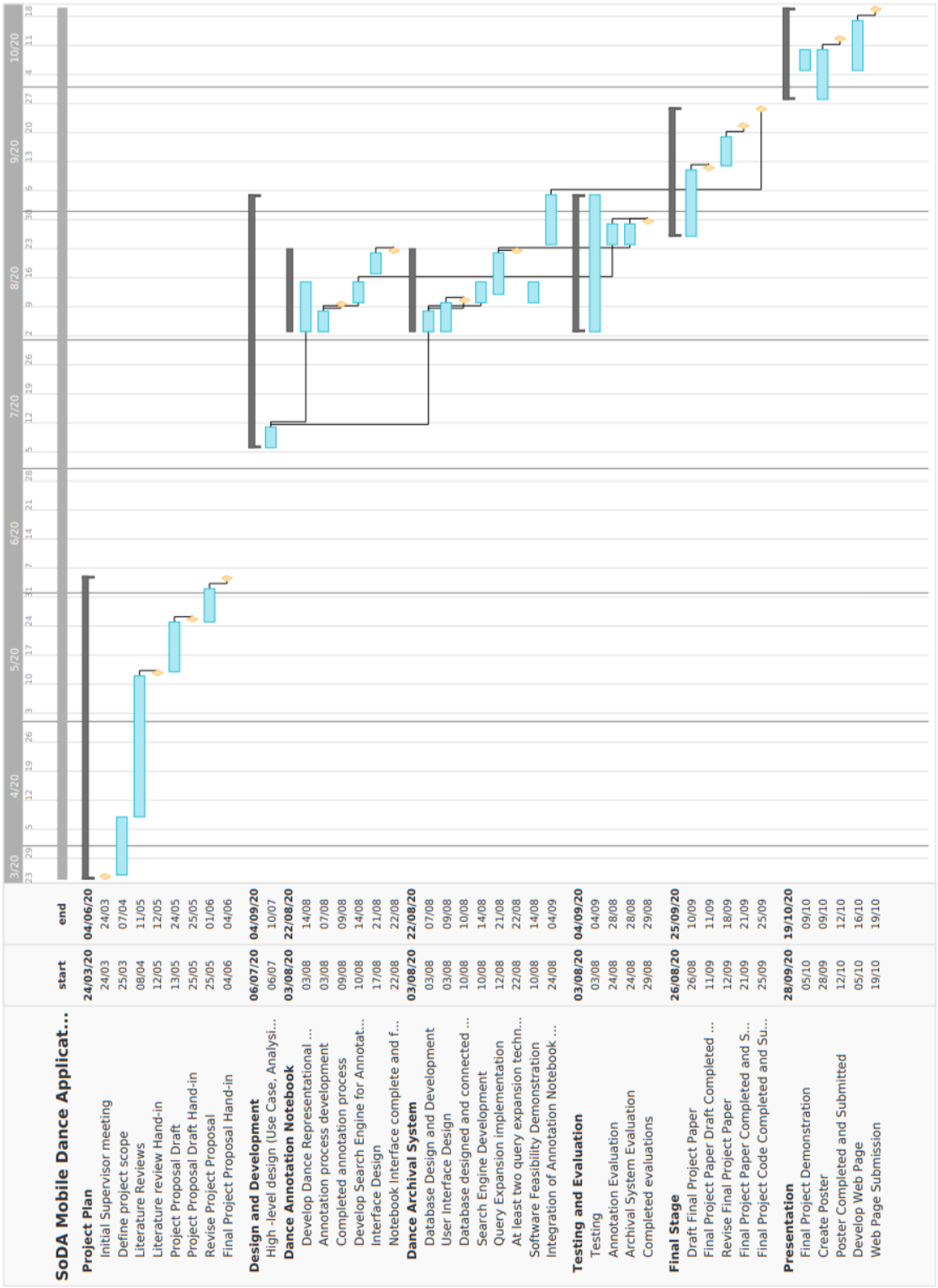

Figure 2: Project Timeline of tasks an milestones as a Gantt chart