Software Requirements Specification

for

Dannosource

Version 1.0 approved

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SEECS (NUST)

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Table of Contents

Revision History

Name	Date	Reason For Changes	Version
Dannosource	09-12-22		1.0

1. Introduction

1.1 Purpose

The purpose of this document is to identify the need for accurate, and readily available annotated datasets. Experts that require accurate and rea

1.2 Intended Audience

This document is intended for the use by the developers and testers of this project. Moreover, it is intended for the project supervisors for product validation and verification purposes.

1.3 Product Scope

The aim of this project is to ultimately provide a fast and reliable solution to anyone that requires accurately annotated datasets quickly. Moreover, it would be a great opportunity for annotators as a one-place platform would be available without being specific to a single domain.

This project will allow anyone to get fast, reliable, and accurately annotated datasets with ease. The users will be able to upload their datasets and assign the annotation job to people of their choice. The annotator will be able to annotate right there, whenever they want. The users will be able to review the annotated datasets and then either accept, reject, or suggest changes to the current dataset.

2. Overall Description

2.1 Product Perspective

The project aims to provide a web-based platform that allows the collaboration of freelancers and experts. Freelancers will annotate images and then experts will review those images and classify

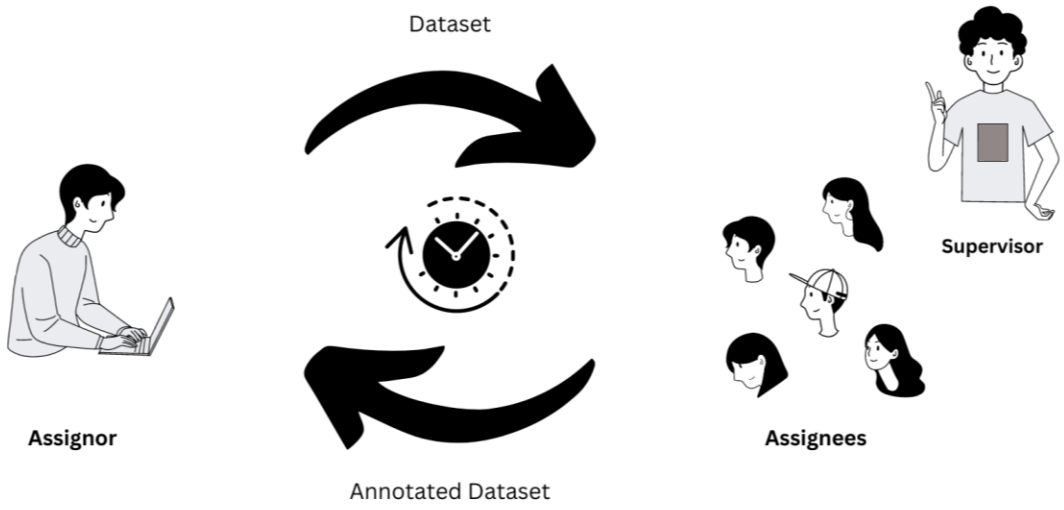


Figure 1 Workflow Methodology

them as either accurate or not accurate and then accept or reject them immediately. Additionally, the client can also assign supervisors over the annotators to ease the workflow. This will save the experts a great amount of time and effort and allow them to focus on their main tasks rather than spending large amounts of time on annotating images. The product aims to deliver its objective by implementing the *divide-and-conquer* methodology.

2.2 Product Functions

The system must provide, at a minimum, the following functions in accordance with the other requirements described within this SRS document.

Assignor's Perspective:

- Import and export Datasets.
- Assign annotation jobs to assignees.
- Request supervisors for supervision.
- Review annotated datasets.

Assignees' Perspective:

- Apply for annotation job.
- Annotate the images (Bounding Boxes, Polygons, Semantic Segmentation, etc.)
- Submit annotated dataset for reviewing.

Supervisor's Perspective:

- Accept supervision offers.
- Feedback and Overlook annotators.
- Review annotated datasets.

2.3 User Classes and Characteristics

The product primarily targets Machine Learning enthusiasts of all fields and experts of the Computer Science domain who lack a big team to help in their ML & AI endeavors. These users are classified as the **Assignor** and can put up annotation jobs and review the annotations.

The other user class is the **Assignee**. These users will apply for annotation jobs posted by assignors. After acceptance, they will annotate the images via the tools available and submit their jobs.

The third class is the **Supervisor**. These would be users who are assigned by the assignor over all of the assignees. They represent the mature annotators who will supervise all the annotators and ensure homogeneity among the tasks. The selection of

2.4 Operating Environment

The system must operate within common web-browser environments.

2.5 Design and Implementation Constraints

A major system design constraint is the memory constraint dealing with the handling of datasets. Since Cloud Services are utilized in this regard. Therefore, an optimal Business Logic has to be modeled in line with this issue. Adequate storage for image datasets should be readily available at all times.

2.6 Assumptions and Dependencies

It is assumed that the site will handle only image datasets for Dannosource version 1.0. Furthermore, cloud services should always be available for successful uploading of image datasets.

3. External Interface Requirements

3.1 User Interfaces

Signup Page
The signup page will allow users to create a new account. When signing up for a new account, users will be required to enter a unique username, email, password, and re-enter password. Once the user has entered the details required for creating a new account, they will be asked whether they want to create a new account as a freelancer, or an expert.

- The sign-up page will contain email, username, password, and password confirmation.

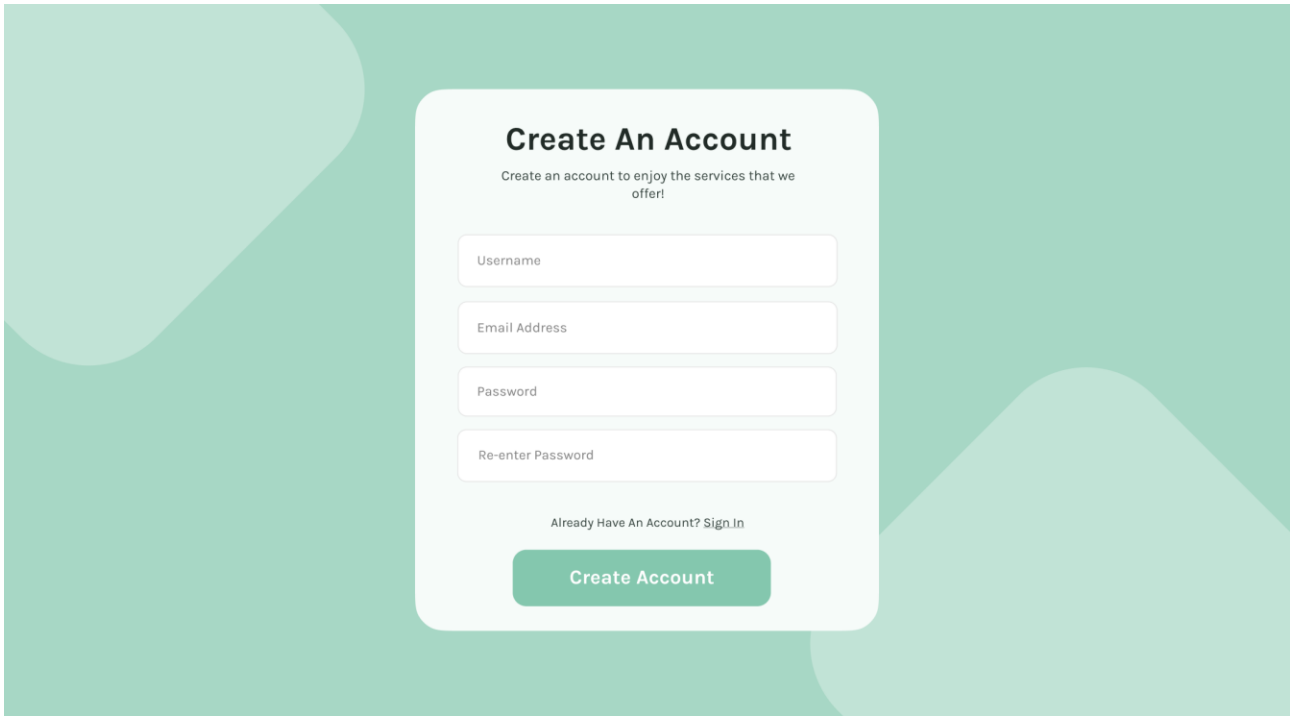


Figure 2 Sign Up Page Mock Up

Login Page

The login page will allow users to login to their existing account. Once the user has entered the correct login details for their account, they will be redirected to the home page. Users will also be able to login using their google account.

- The login page will contain username/email, and password to login.

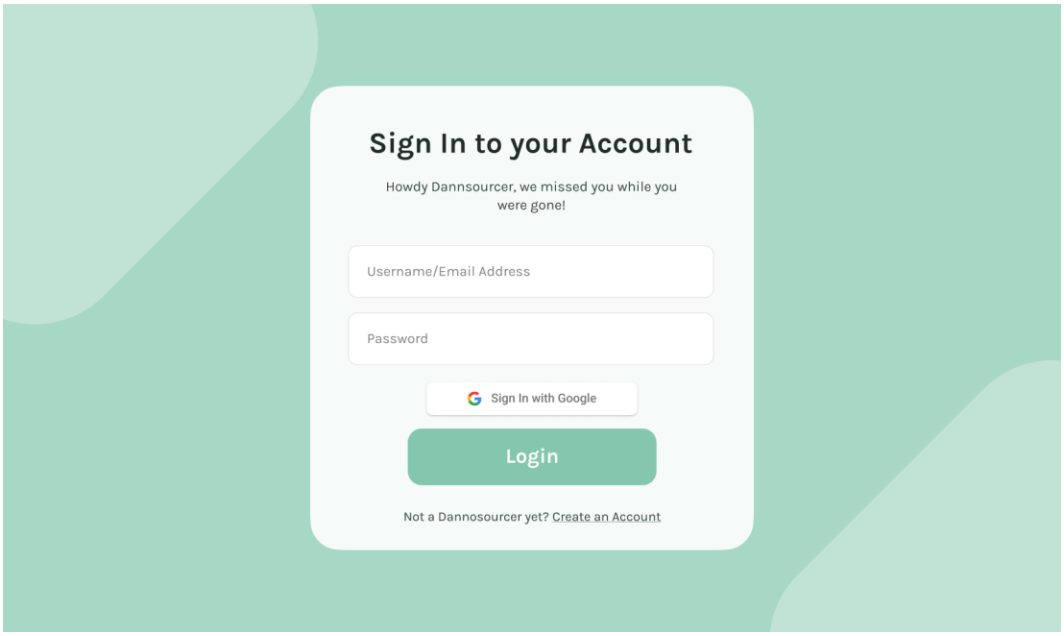


Figure 3 Login Page Mock Up

Home Page/Dashboard

The home page will have a navbar (navigation bar) on top of the page. On the right most side of the navbar, the user's profile picture will be displayed. Once a user hovers over the profile picture, a dropdown menu will appear, with options to logout, switch account type (from expert to freelancer, and vice versa), edit profile, and access settings.

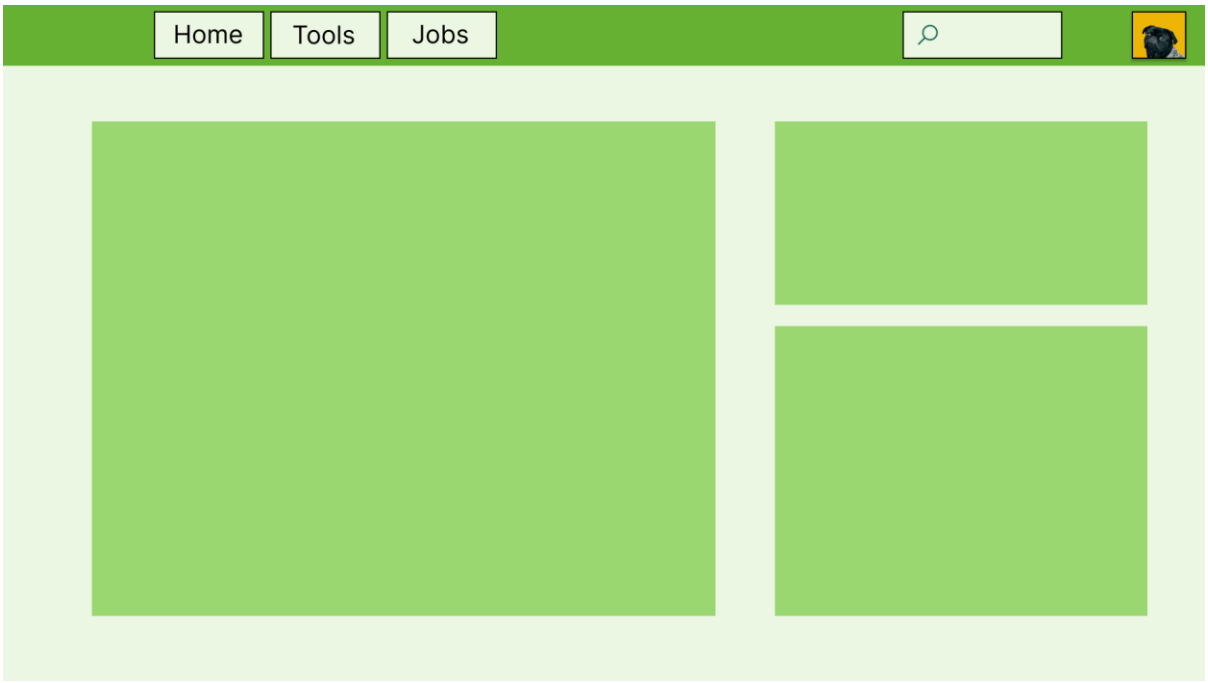


Figure 4 Home Page Mock Up

Search Page

Once users enter a keyword into the search bar, displayed on the navbar, they will be redirected to a search page, that will the appropriate search results.

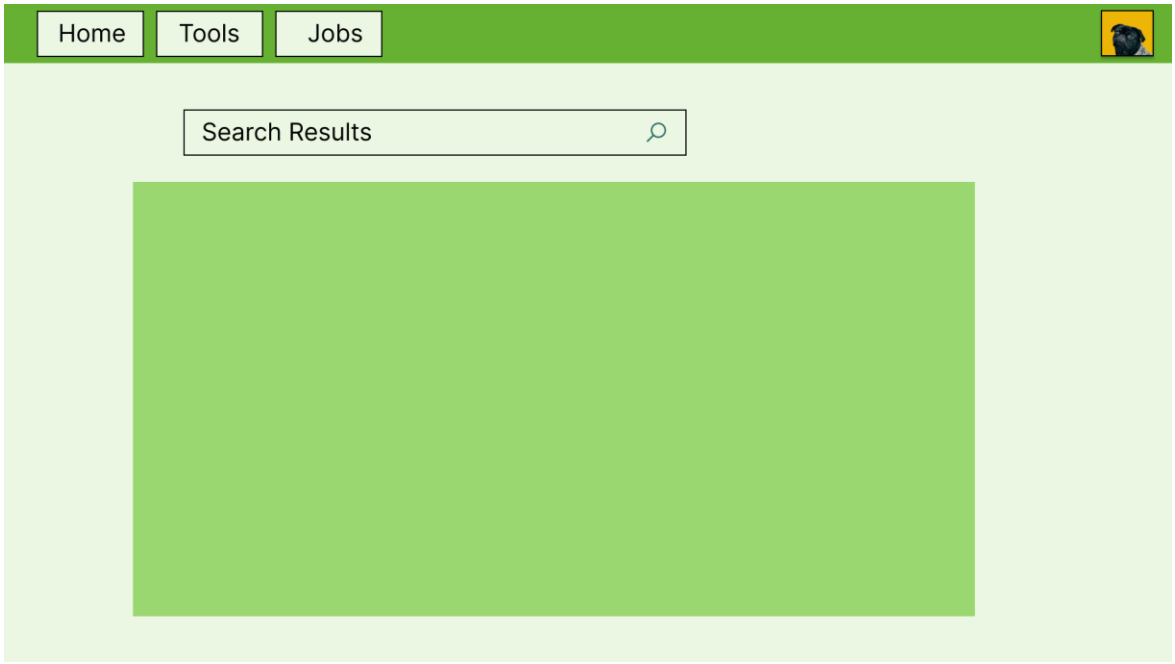


Figure 5 Search Page Mock Up

Annotation Workbench

The workbench will display a canvas on most of the pages. On the top of the canvas, various commands like save, etc. and tools.

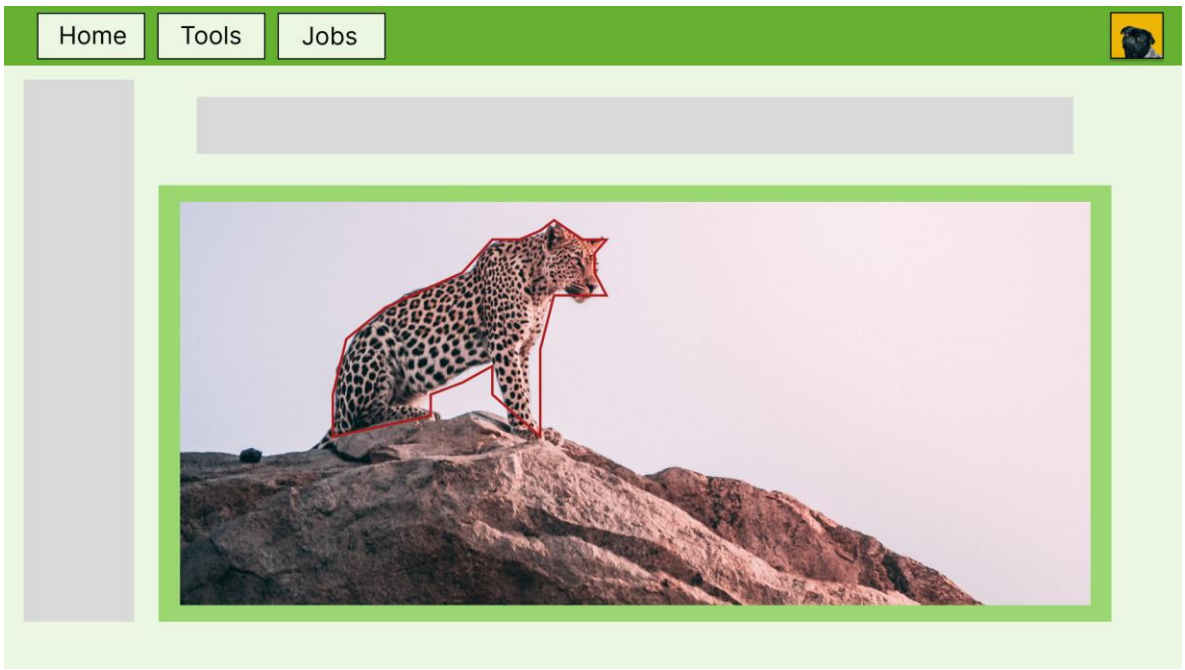


Figure 6 Annotation Workbench Mock Up

3.2 Hardware Interfaces

The user may access the web browser via a desktop or laptop. There is no special designated hardware required for this system. The interaction can be done via mouse clicks/stylus, etc.

3.3 Software Interfaces

- Cloud storage services (Digital Ocean 1.84.0)
  For storing datasets to be annotated.

- MongoDB
  For storing user's information.

3.4 Communications Interfaces

- The application will use TLS v1.x for data encryption.
- HTTPS will be used for accessing the web application.

The transmission of data will take place over a network in an encrypted format. When using a computer and a web browser to access the application, the user will be using HTTPS to access the web interface.

4. System Features

4.1 Authentication

4.1.1 Description

It allows a user to create accounts and access the system using those accounts.

4.1.2 Stimulus/Response Sequences

Once the user has successfully navigated to the Dannosource website, the sign-up page will be displayed. To sign up and create a new account, the user must enter their unique username, email, password, and then re-enter the password. Then the user must click on sign **up** to create a new account.

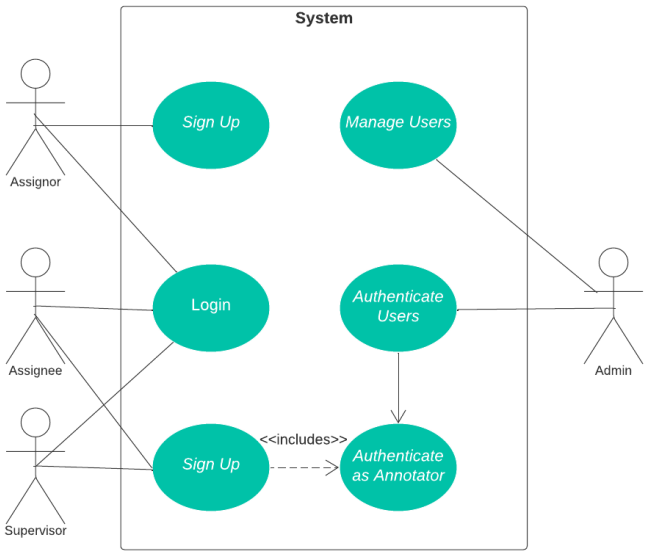


Figure 7 Authentication Use Case

The user can also sign up and create a new account by signing up using their google account. The user can login to their account by navigating to the login page and entering their username/email and password to login. Once a user has correctly entered their login details, they shall be redirected to their home page.

4.1.3 Functional Requirements

FR-4.1.3.1: The username must contain only alphanumeric characters and underscores.
FR-4.1.3.2: The username for each user must be unique.
FR-4.1.3.3: The password length must be at least 8 characters long, and at most 16 characters long.
FR-4.1.3.4: Each password must contain a number, an upper-case letter, and a special character.

FR-4.1.3.5: The email for each account must be unique. (One email can be used to login to one account only).

FR-4.1.3.6: Users shall be able to create a new account using their google account.

FR-4.1.3.7: The users to be specified as an annotator, they must clear an annotation test. (Annotation Testing scheme TBD)

FR-4.1.3.8: Once a user has cleared their Annotation Skills Test, then only they can propose to do jobs.

4.2 Datasets Management

4.2.1 Description

This feature covers the start and end of the whole Annotation process. It focuses on how the dataset is to be uploaded and dealt with, eligible formats, etc. Moreover, it focuses on the end-product, the annotated dataset, and its formats.

4.2.2 Stimulus/Response Sequences

The assignor will upload the dataset to be annotated. The dataset will be kept in the cloud storage affiliated with the user. After annotations are performed, the new dataset with annotations saved can be exported in the desired format by the assignor.

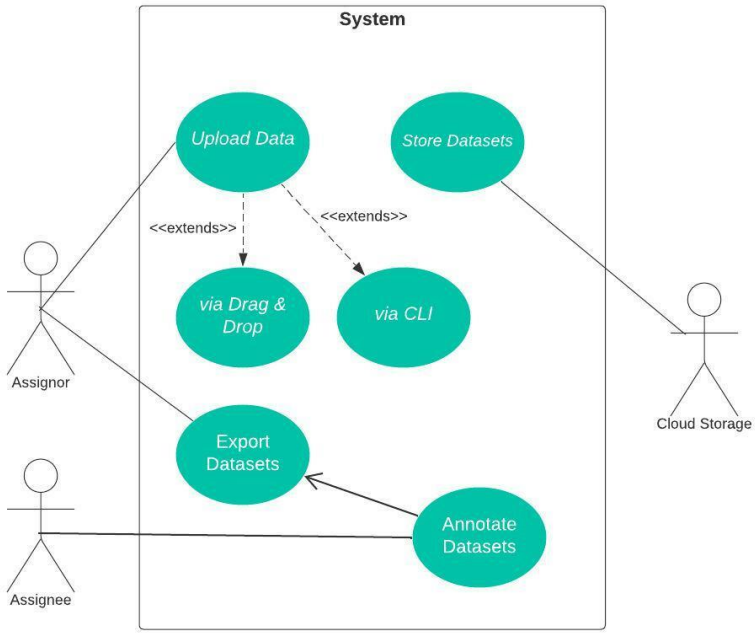


Figure 8 Datasets Management Use Case

4.2.3 Functional Requirements

FR-4.2.3.1: The user shall be able to upload images and create a dataset.
FR-4.2.3.2: The user shall be able to add necessary information to a dataset i.e., Title, Instructions, Annotation type.
FR-4.2.3.3: The user shall be able to make an *export version* of the dataset. Export version will be a form of version control.
FR-4.2.3.4: The user shall be able to select images (with completed annotation or a selection) to be exported for an *export version*.
FR-4.2.3.5: The user shall be able to choose from the export formats available. The export eligibility must be verified for format against annotation type.
FR-4.2.3.6: The import formats for this version shall be JPG, JPEG, PNG, and BMP.
FR-4.2.3.7: The export formats for this version shall be JSON, XML, COCO, CVAT, PASCAL VOC, and PNG (listed in the order of priority).
FR-4.2.3.8: The assignor and supervisor must be able to view dataset grouped by annotators.

4.3 Job Posting

4.3.1 Description

Users that are logged on to their accounts as experts shall be able to create and post new jobs for the annotation of datasets.

4.3.2 Stimulus/Response Sequences

The users can create a new job by accessing the create job option either from the navbar, or from the home page. Once the user clicks on create job, they will be redirected to a page which will ask the user to enter details about the job, and to link the dataset (already uploaded or prompted to upload).

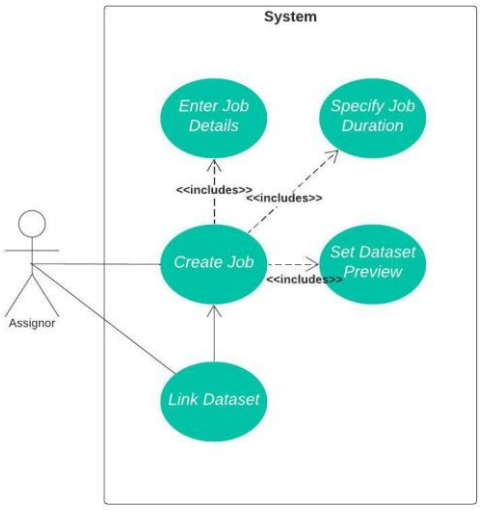


Figure 9 Job Posting Use Case

4.3.3 Functional Requirements

FR-4.3.3.1: The user shall add the Job Title, Information, Deadline to a job post.
FR-4.3.3.2: A sample of the dataset up to 10 images should be selected for the data preview in the job post.
FR-4.3.3.3: The annotation to be performed should be explicitly mentioned in the job post.

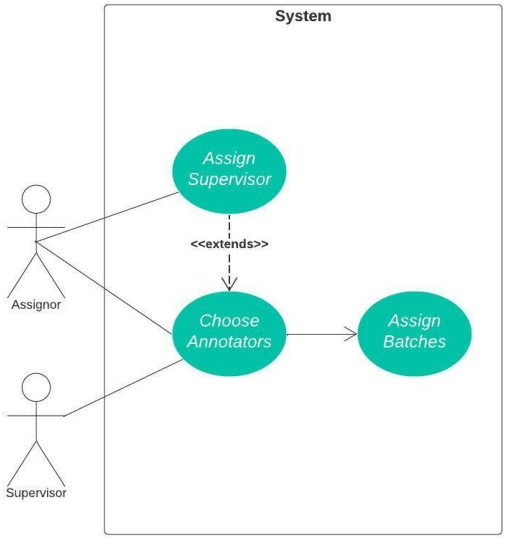
4.4 Job Assignment

4.4.1 Description

The job assignment refers to the functionality through which an assignor assigns annotators to a dataset. It includes acceptance of the proposal by the annotators, assigning as many annotators as required, selecting batch size for every annotator and other customizations.

4.4.2 Stimulus/Response Sequences

Once proposals are received, the assignor accepts as many proposals as they want and add the annotators to their dataset. The assignor selects the batch size for each



annotator.

Figure 10 Job Assignment Use Case

4.4.3 Functional Requirements

FR-4.4.3.1: An *assignor* and *supervisor* (if permitted) can accept the proposal of an *assignee* and assign them the dataset by specifying the batch to by a single annotator.
FR-4.4.3.2: An *assignor* can assign *supervisor* to overlook all the annotations and review the tasks by the annotators.
FR-4.4.3.3: At the time of job assignment, the batch size should be dedicated with images selected *manually*, by *shuffle*, *default* (in order of upload).

4.5 Job Search & Proposal

4.1.1 Description

Users that are logged onto their accounts as freelancers shall be able to search for jobs and send proposals to currently listed jobs.

4.1.2 Stimulus/Response Sequences

Users shall be able to search for jobs by either clicking on the search jobs button on the home page, or by searching for jobs using the search bar. Once a user finds a job that they like, they can send a job proposal to the client.

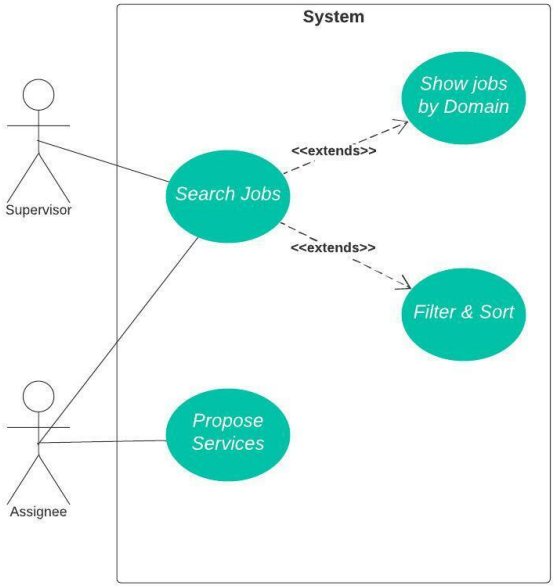


Figure 11 Job Search & Proposal Use Case

4.1.3 Functional Requirements

FR-4.5.3.1: Users shall be able to propose for a job once authenticated after passing the Annotation Skills Test.
FR-4.5.3.2: Users shall be able to be enrolled in multiple jobs at once.
FR-4.5.3.3: Users shall be able to send only one proposal for each job.
FR-4.5.3.4: Users shall be able to search for jobs by *field* and *keywords.*
FR-4.5.3.5: Users shall be able to filter & sort search results by *Date Published*, *Pay Range*, *Number of proposals*, etc.

4.6 Annotation Workspace

4.6.1 Description

This is the main task of the whole objective of the project. The annotation to be performed on the datasets is of key importance and the process has to be very smooth and efficient.

4.6.2 Stimulus/Response Sequences

Prior to the actual annotation, the annotation type and annotation classes are defined. The annotators will use assisting tools to annotate the data and send it for review.

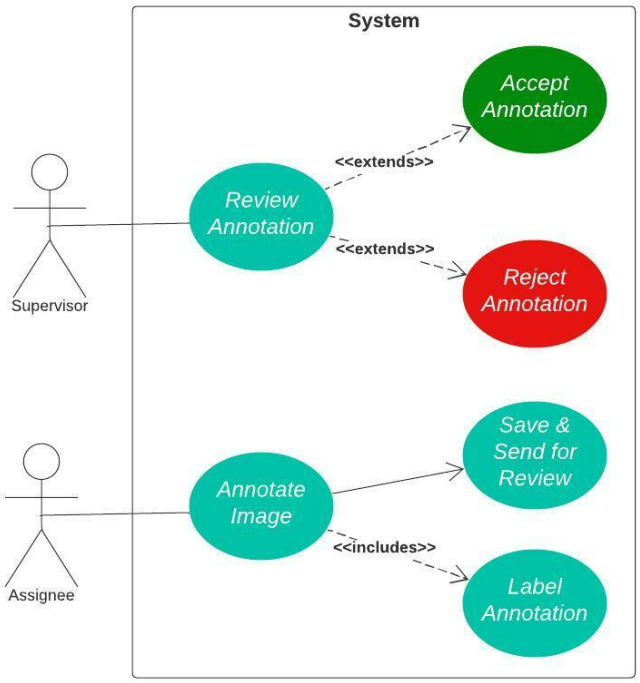


Figure 12 Annotation Workspace Use Case

4.6.3 Functional Requirements

FR-4.6.3.1: The annotation class defined must be differentiated distinctively on the annotation either via colors or tags.

FR-4.6.3.2: The annotations prioritized for this version are to be Box plots, Polygons and Semantic Segmentations.

FR-4.6.3.3: The annotations made should remain editable i.e., could be tweaked after reviewed.

FR-4.6.3.4: The annotated masks' opacity and boundary hardness should be adjustable.

FR-4.6.3.5: A supervisor must be able to tweak the annotations by every annotator (With proper logging).

4.7 Job Management

4.7.1 Description

In the annotation workflow, this is the final stage. The annotations made are sent up for review, and after successful completion of the batch assigned to an assignee, the job is done. The users must have personalized dashboard for efficient job management.

4.7.2 Stimulus/Response Sequences

After the annotation, the assignee's work is reviewed by the assignor/supervisor. They either accept or reject and provide remarks. If changes are to be made, the assignee receives back the image and tweaks the annotation as required.

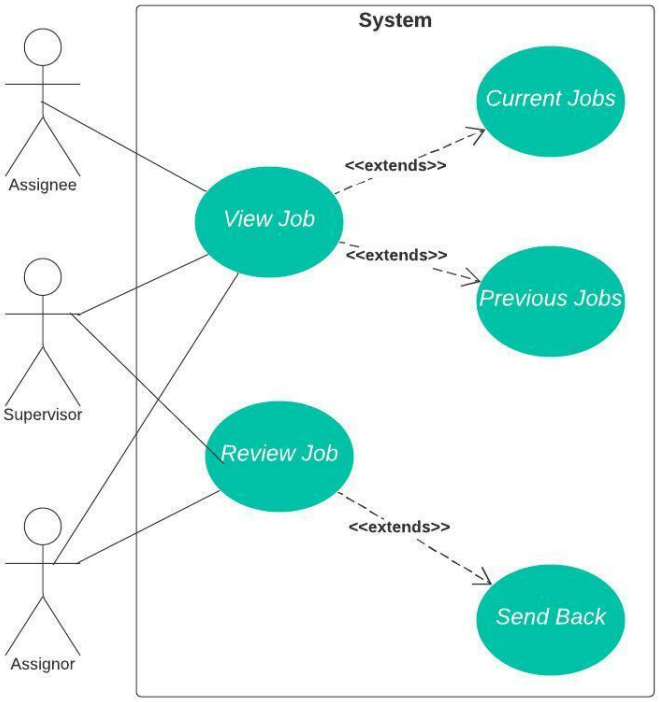


Figure 13 Job Management Use Case

The user navigates to a page from their dashboard where they can see all jobs they have assigned currently or job they are currently working. It would also include previous jobs and jobs they have proposed their services to.

4.7.3 Functional Requirements

FR-4.7.3.1: The images that are under review, completed, or being redone should be distinctively differentiated in the dataset.

FR-4.7.3.2: The job is done by an assignee once the complete job assigned to them is marked completed by the assignor.

FR-4.7.3.3: If a job is withdrawn after an assignee has started working on the tasks. A fixed percentage is to be deducted from the assignor's side.
FR-4.7.3.4: An assignor must be able to see all their previous and present jobs posted along with all necessary information including annotators/supervisors who worked/are working on the jobs.
FR-4.7.3.5: An assignee/supervisor should be able to view all their jobs they are working on and previously worked on.
FR-4.7.3.6: An assignee should be able to view list of present jobs they have proposed to, they must have an option to withdraw.

4.8 Billing & Payment

4.8.1 Description

Once the expert approves the annotated datasets sent by the freelancer, they will be redirected to the payment page. The expert will then pay the freelancer the discussed fee for the job. Experts will automatically be charged a certain amount for the monthly premium subscription each month. Proper Business Plan for the Billing and Payment methodology is TBD.

4.8.2 Stimulus/Response Sequences

Once the expert is satisfied with the annotated datasets sent by the freelancer, they will click on the accept datasets button. This action will redirect the experts to the payment page where they will confirm billing details and the promised fee will be paid to the freelancer.

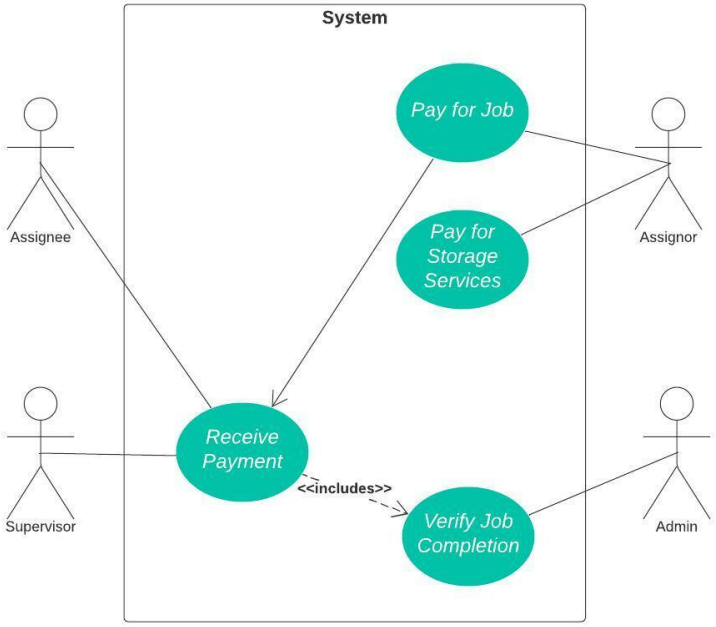


Figure 14 Billing & Payment Use Case

4.8.3 Functional Requirements

FR-4.8.3.1: On the 30th of each month, subscription charges will be charged for the next month.

FR-4.8.3.2: If a user (expert) fails to pay the monthly subscription charges by the 10th of the month, their subscription will be cancelled.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

NFREQ-5.1.1: An upload/download functionality via CLI commands should be available to ease flow of large volumes of data.
NFREQ-5.1.2: The application shall be developed in a way that allows for scalability, without slowing down the app.

5.2 Security Requirements

NFREQ-5.2.1: The application shall use cloud encrypted, and secure cloud-based storage services.

NFREQ-5.2.2: A user rights agreement must be signed to restrict usage of someone's without consent.

5.3 Software Quality Attributes

NFREQ-5.3.1: The app shall be available as a web-application that is accessible on most modern web browsers.
NFREQ-5.3.2: The UI of the app should be user-friendly.
NFREQ-5.3.3: The training time of the app shall be under 1 hour.

Appendix A: Glossary

Assignor	Refers to user class who posts a job, reviews the annotations, and choose people as assignees.
Assignee	Freelancers who annotate the datasets.
Supervisor	An optional role that supervises the annotation workflow, and therefore ensures the homogeneity of annotated datasets.
Job	An annotation task or multiple tasks that are posted as an advertisement.