An Interface for the Capture and Access of Freeform Annotations of Biological Fieldwork

Sample CS376 Project Milestone #1

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ABSTRACT – A ~100-150 word summary of the interface you plan to prototype, the hypothesis of the *value* that it provides the user, and how you plan to evaluate if your hypothesis is true or false.

> Field biologists keep detailed notebooks to provide complete accounts of the time, location, conditions, and other annotations related to the data/specimens they collect. Annotations may comprise voice, writing, photographs, and video. However, back in the lab, they find it difficult to associate data/specimens to their annotations. The proposed interface employs speech and handwriting recognition, GPS, and timestamps to associate freeform annotations with relevant data and specimens. It will allow researchers to organize their annotations by topic, location, and time, enabling them to compose *more complete* field accounts with *fluidity and efficiency*. To validate our claims, we will conduct a comparative study between researchers who are equipped with our system, and researchers using current tools. Experts (other biologists who ask for and read these field notes) will compare the end products. We will measure the time/steps required to compose the accounts, and conduct surveys on the usability of the interface.

TASK ANALYSIS – Who are the users? What tasks will the users need to perform? What new tasks do they desire to perform? Where are the tasks performed? How are the tasks learned? What set of tools does the user have now? How often do your users perform the tasks? What happens when things go wrong? What's the relationship between the user and his or her data? How do your users communicate with each other? With whom do they communicate?

Use the questions above to guide your task analysis. This should be one or two paragraphs.

> We target biology researchers (graduate students and faculty, and possibly undergraduate research assistants) who regularly collect specimens in the field. One task they perform is to organize field notes and associate them with the specimens. Currently, they review their notes by hand to find relevant annotations. They might use a database (such as MS Access) to associate annotations (environmental data, personal notes, photos, etc) with specimens. For each entry (i.e. specimen record) in the database, the biologist must revisit her field notes (handwritten, voice, video, or photo) and find the notes most relevant to the specimen. She will perform this task at the end of a day of fieldwork, inputting the most basic annotations (species, location, time of collection).

However, she will leave the extra annotations for later, as working with it "is most tedious."

Our biologist may work with one or two research assistants, who help her enter this data. Upon submitting her collections to museums, museum curators will ask for complete field notebooks recounting the collection of the specimen. At that time, the user will wish she had organized her notes better, as she will have to revisit them to submit complete accounts. She will compile an account of the area, time/date, and observations she made when she collected the specimen.

IDEATION – Sketches and Storyboards of your ideas. This will be the main part of your grade for this assignment. We want to see lots and lots of ideas. Brainstorm! Not all your ideas have to be related to your proposed system. You may turn in actual pen-on-paper sketches, or scanned in sketches, or digital sketches done in Illustrator, Flash, etc. Sketches and storyboards should be accompanied by short blurbs to explain each idea.

See Appendix.

EVIDENCE – Present some evidence that your idea is a good one. What observations did you make during your contextual inquiries that support your idea? What other systems exist that support similar tasks?

During contextual inquiries with biologists, we found that biologists keep handwritten notes to record fieldwork. Several reported that they would like more photos, or video, but the more data you collect, the more work it is to go back and filter through it. However, keeping extensive field notes is described (by one biologist) as "the ideal way to work."

When biologists compare work, or submit their specimens to museums, they must provide complete field notes describing the situation when the specimen was collected. What was the environment like? What time/date/location did she collect the specimen? At those times, she must revisit old notes, and assemble to the best of her ability a complete set of field notes.

Mackay [2002] has created an augmented lab notebook for biologists. Her research showed that biologists can do more when you provide links between the physical notebook and the digital annotations of the data in the notebook. With these links, biologists can search and organize their information more effectively.

FURTHER EVIDENCE – How will you collect further evidence to support your intuition that your system is a good one?

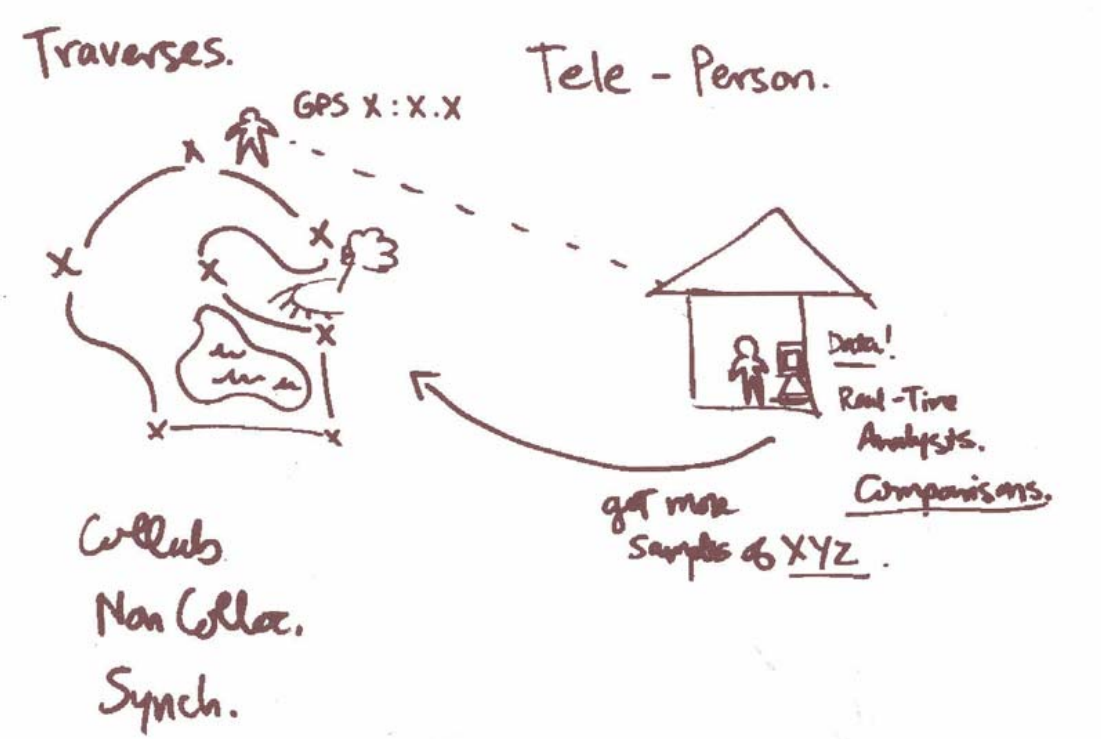
We plan to conduct more contextual inquiries to direct our research. Our future inquiries will be focused on the system we propose. We will also visit the California Academy of Sciences to see how biologists work with collections of specimens, and observe what role field notes play in the collection and use of specimens.

We plan to create a paper prototype, and run a preliminary study to see if the interface and visualizations are sound. Then, we will create a working prototype out of a time/GPS synched digital recordings, and hand and voice notes that are run through “hand writing and voice recognizers (diligent grad students)”. The interactive prototype will form the basis of our final user tests.

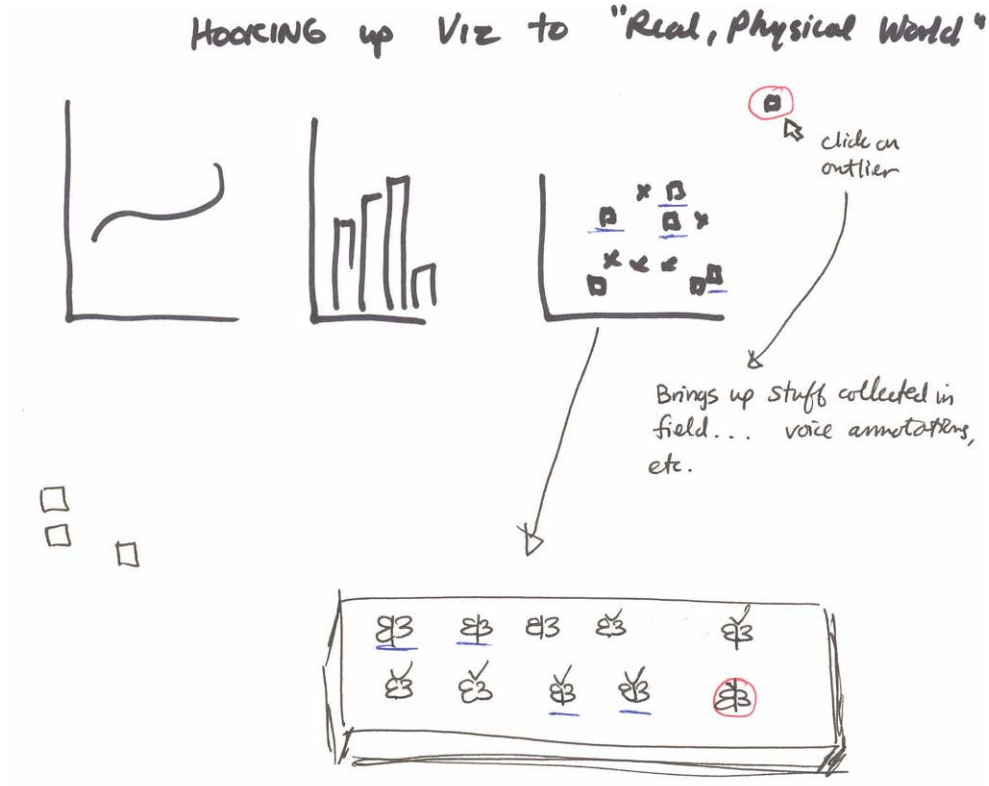
EVALUATION PLAN – How will you evaluate your hypotheses? What type of user tests? How do you plan to set up your user tests? How many people will participate in your study?

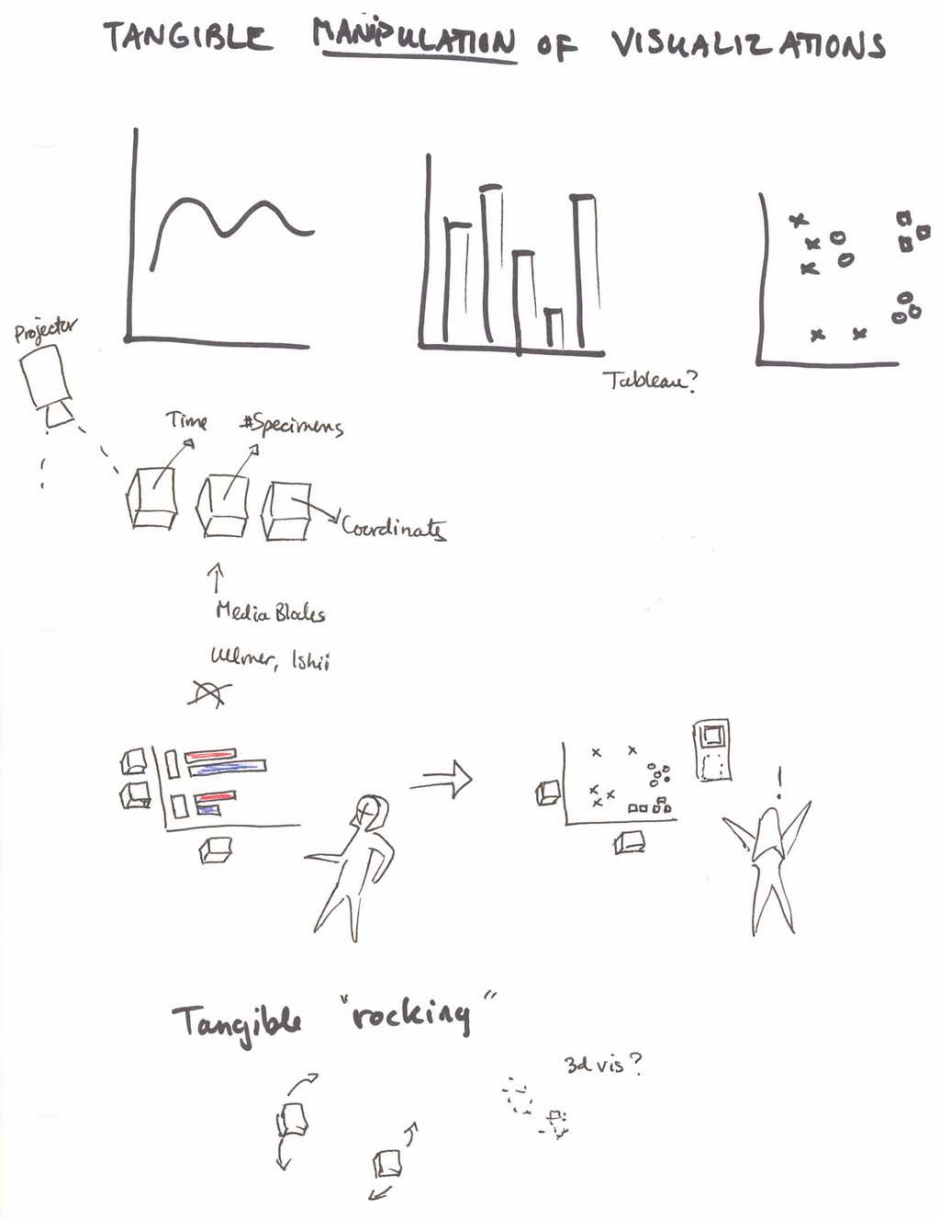
We will have ten biologists participate in our experiment, drawn from our contacts in the biology department. Five will use our prototype system/interface. Five will use current tools. We will ask them to “visit the field” (watch our videos and audio), and take field notes in any way they can, as complete as possible. This field trip will take 45 minutes. Back in the lab, they will compose a 3 page set of field notes to accompany a butterfly specimen that they “collect” in the field (at 7 minutes into the “field trip”). Expert evaluators will evaluate the completeness and quality of the notes.

Appendix I – SKETCHES/STORYBOARDS



The above idea represents a tele-researcher, where preset watches (triggers on data) can red flag measurements and direct the researcher to revisit measurement stations to check if the data were indeed correct. This is a major labor saver (*efficiency*).

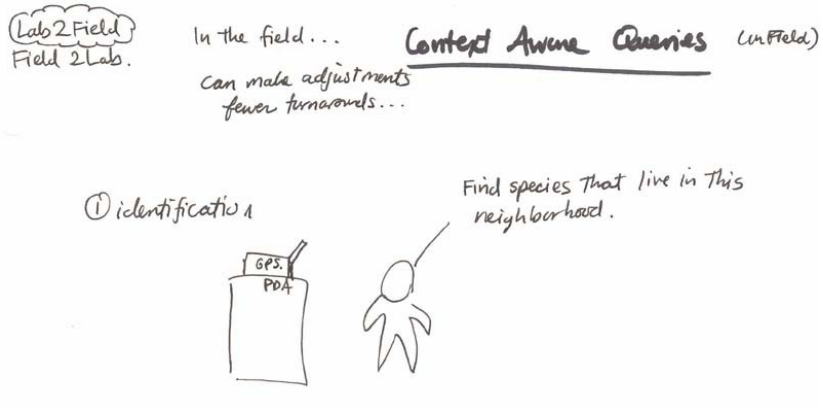


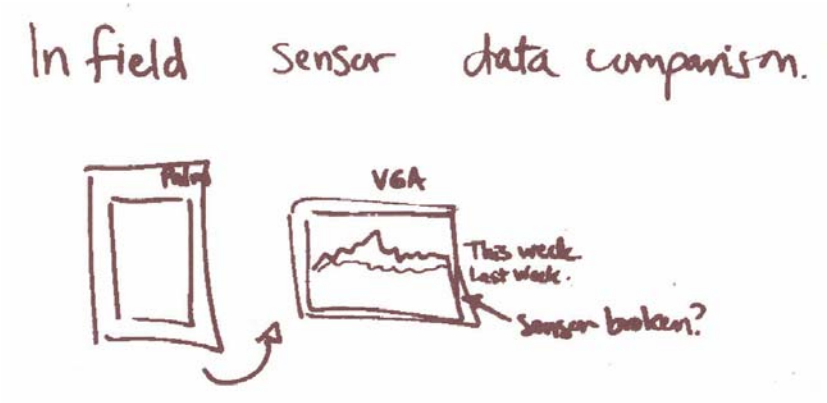


The two sets of sketches above represents ways to bridge the gap between digital visualizations and the physical world. One one with butterflies allows a researcher to work with a data visualization, and see data points or aggregates displayed as highlights of physical specimens.

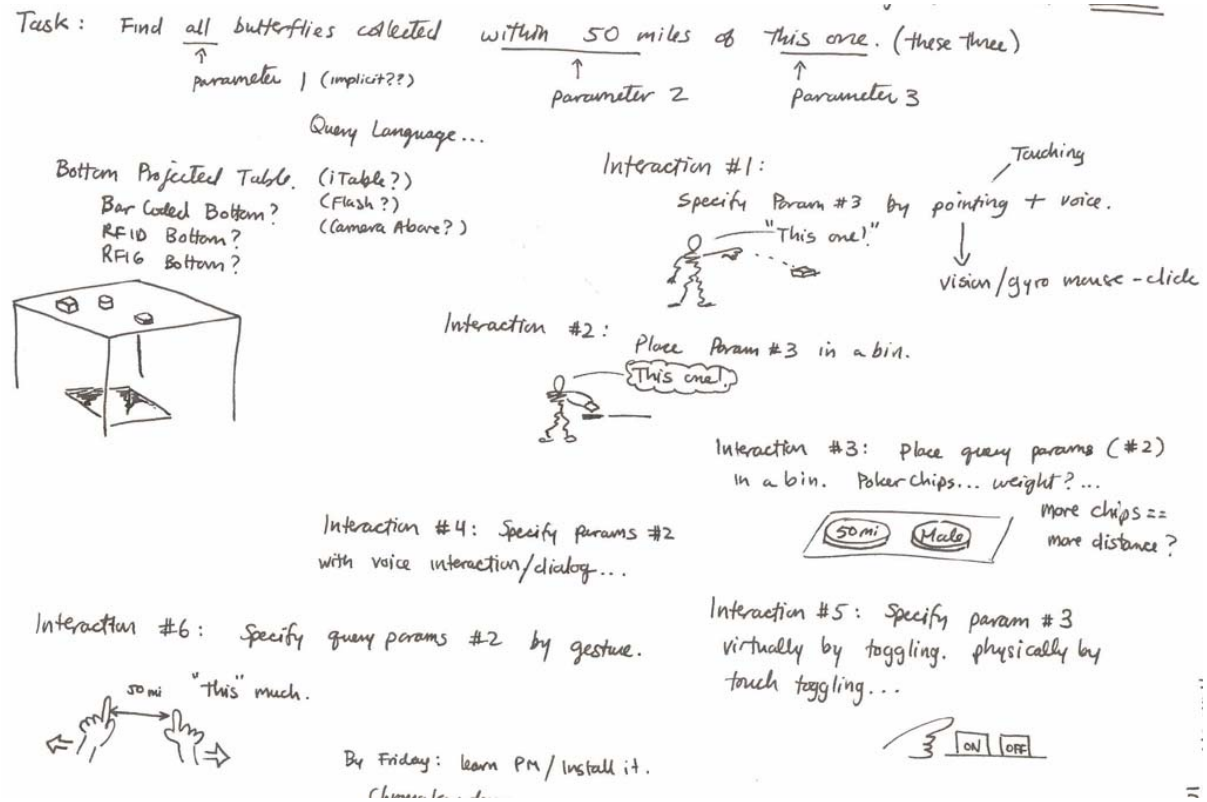
The bottom sketches show a tangible interface for exploring visualizations, built on top of Tableau.

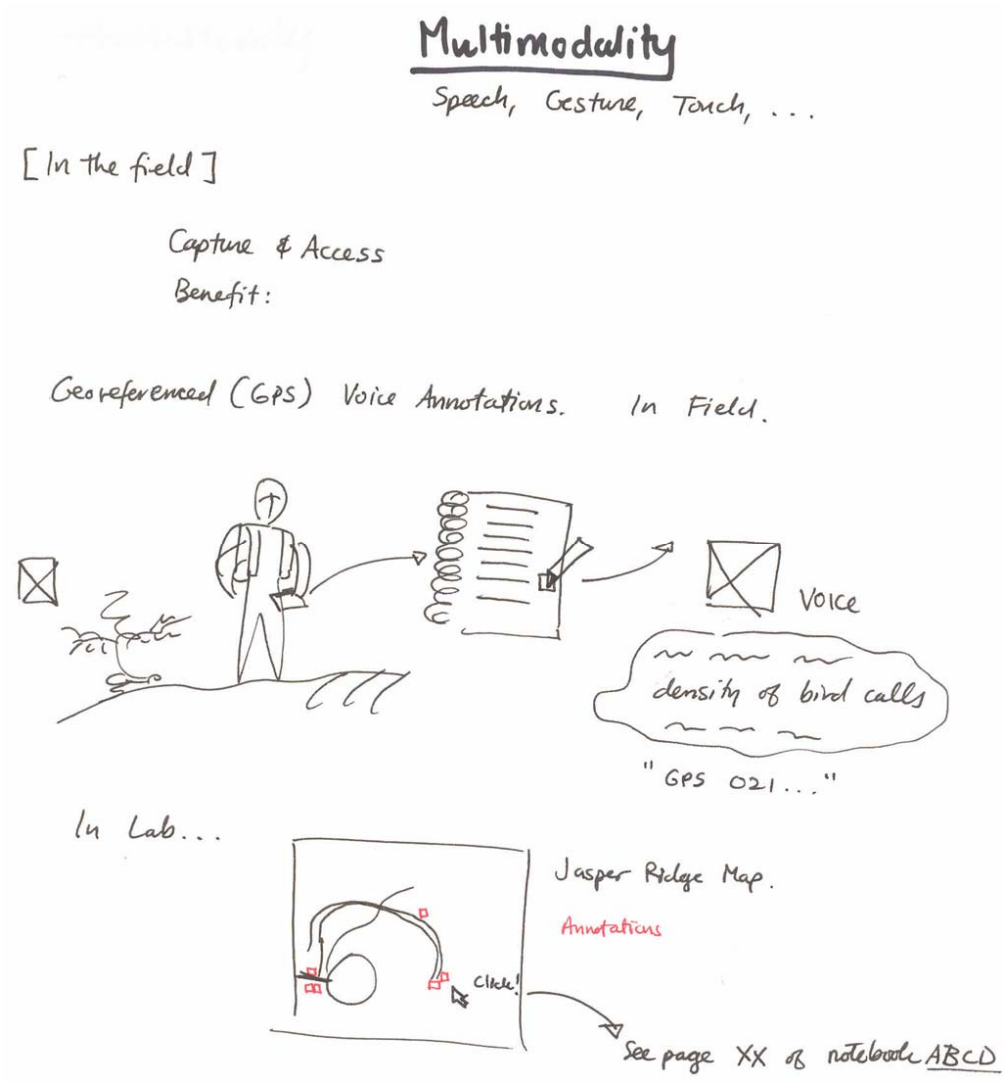
The sketches below describe a way to perform context aware queries of your data while in the field. With GPS, you can automatically bring up data that was collected at the same place/time as last week. You can compare graphs, and check residuals. You can find information related to where you are standing (which species live in this neighborhood?).



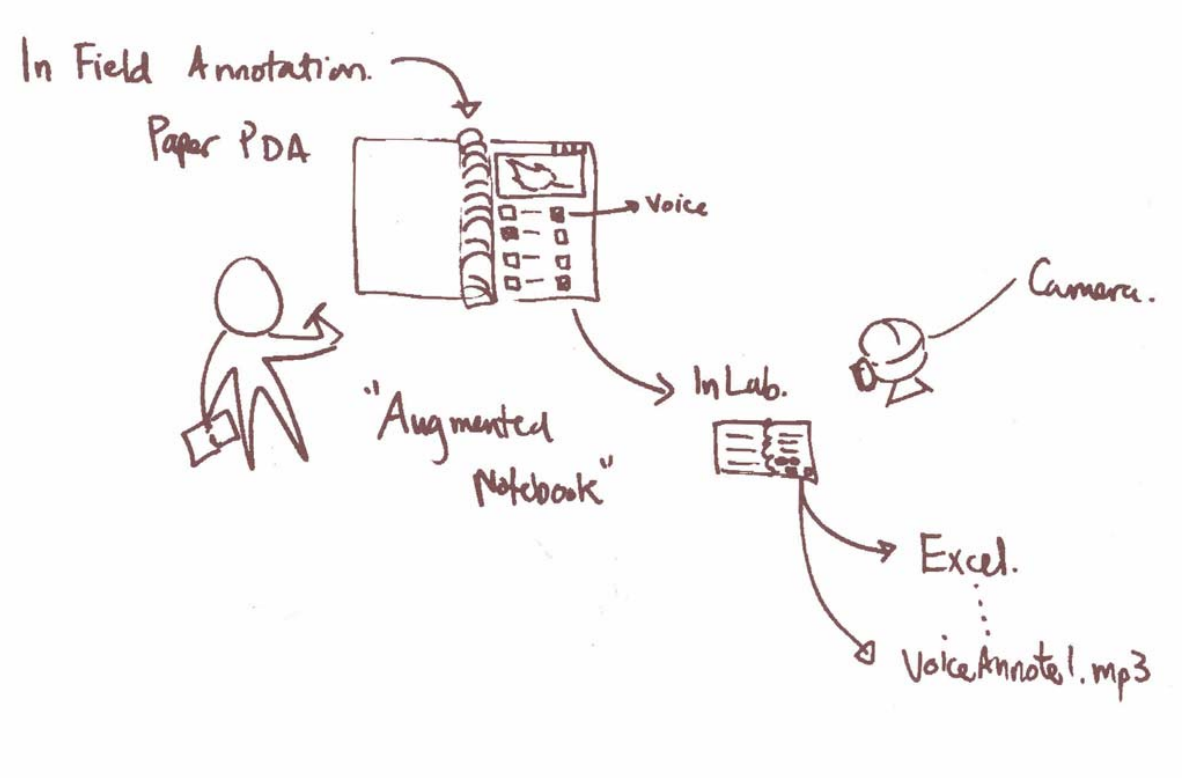


The sketches below describe a tangible, geo-referenced system for performing queries on physical specimens. There is a gesture language for performing ANDs and ORs. There is a fuzzy gesture based way to express parameters (such as “about 50 miles”).

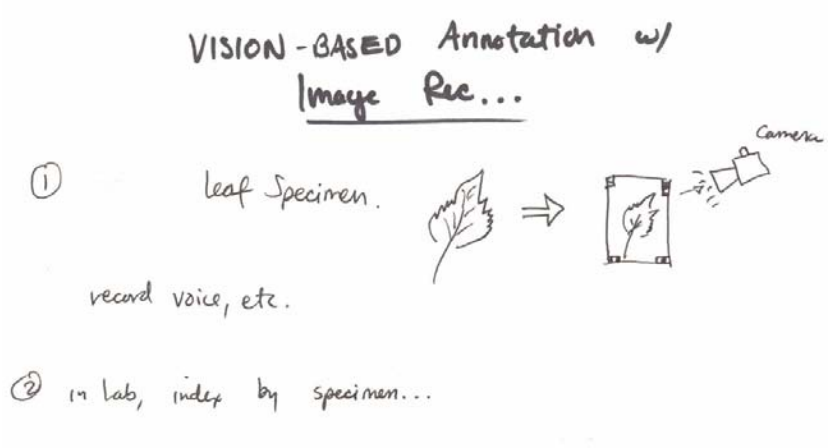




The idea above describes an augmented field notebook that tracks when and where you make your annotations. Back in the lab, the biologist can visualize the data points on a map, and organize their annotations better.



The idea above describes a multimodal way to annotate your field notes. The pen (or augmented notebook) recognizes when you check the "voice" box, and will start recording your voice.



The idea above describes a way to use physical specimens to access your annotations related to that specimen. This is related to the two "augmented notebook" ideas above.