

# Meeting minutes

**Monday 18th of September - John Williamson's office - 9 am**

## **First meeting**

We first talked about nomograms, my maths/stats knowledge.

We talked about the programming languages / technologies such as Python, JavaScript , Jupyter notebook, Pynomo , Bocca, Plotly, custom rendering , iPyCanvas.

Talked about library resources such as "

The History of the nomographic computation" , Rabbit, Google Scholar

The objectives for next week was to create a week by week plan, read literature, try to understand the problem .

Talked about the features, data import, and visualisation settings like ray colouring.

**Friday 29th of September - John Williamson's office - 11 am**

## **Second meeting**

I read the Statistical Rethinking book and articles about nomograms, their uses, their history. We discussed the use cases, how to evaluate the program, how to combine the nomograms with statistical methods.

The objectives for the following week were to look at the tools to use to create the nomograms, such as iPyCanvas.

**Friday 6th of October - John Williamson's office - 11 am**

## **Third meeting**

Leading up to this week, I read about Pynomo, and tried to get it to run.

I had an issue with trying to run Pynomo, as it was written in an outdated version of Python. Dr JHW suggested I use 2to3.

The objectives for the following were to create a user interface diagram and scenarios so that we could go over how I wanted the user interface to look.

**Friday 13th of October - John Williamson's office - 11 am**

## **Forth meeting**

Leading up to the meeting, I worked on creating the user diagrams and scenarios. Dr JHW pointed out that some of my design choices, such as the "independent" and " dependent" variables, weren't very suitable. We reviewed the user experience in detail, using slides, rays, customisation options, configuration files, etc.. Next week's plan is to figure out where Pinomo produces the graphs so that I can find them and add the distributions on top.

**Friday 20th of October - John Williamson's office - 11 am**

## **Fifth meeting**

Leading up to the meeting, I tried to extract the coordinates of the nomogram distributions. I did not manage to find exactly where the graphs would be produced. Dr JHW advised me to use some logging to find where they would be drawn. Also regarding the usability of the program, instead of creating a method to generate the parameters for the nomogram creation, I delegated that responsibility to the user as it would be very difficult to find a way to figure out the nomogram type from the equation, as well as other features. The goal for next week is to do some logging to find the areas where the graphs are generated.

**Friday 27th of October - John Williamson's office - 11 am**

## **Sixth meeting**

Leading up to the meeting, I worked on Pynomo again, decided not to use it and looked for other methods, I found a computer vision method to do it, but it is not perfect and needs some extra work on the recognition. The issues we discussed were getting an ideal extraction of the axes, labels and scales would be difficult. Potential solutions identified were using Tesseract and using hand-drawn axes. The objections for the following week are working on the user interface, statistics and axes recognition.

**Friday 3rd of November - John Williamson's office - 11 am**

## **Seventh meeting**

In the week leading to the meeting, I worked on creating the user interface.

Issues discussed in the meeting were the usability of the UI,

solutions: making it more minimalistic, adding a toolbar, using Bezier curves, using a net to select Axes and picking the largest one,

We also discussed how I should do the user evaluation, use logging, ask them to do specific tasks, and potentially do two separate rounds of testing to evaluate the nomogram detection and the probability functions. The goals for next week were to implement lines, curves and contour addition, and improve the UI by removing the unnecessary process button.

#### **Friday 10th of November - John Williamson's office - 11 am**

##### **Eight meeting**

In the week leading to the meeting, I removed the unnecessary process image button, created a better-looking toolbar with icons instead of text labels, and added a lasso selection tool to let the user select where the axes are. I wondered if having the user draw the axes would count as a poor user experience and Dr Williamson's opinion on rectangular selection as he is an HCI expert, and he said rectangular selection can lead to unintended behaviour because of not being able to select the axis you want properly. The importance of having Bezier curves, a ruler, and marking out the ticks for future program iterations was highlighted, and these were the selected goals for the week after.

#### **Friday 17th of November - John Williamson's office - 11 am**

##### **Ninth meeting**

In the week leading up to the meeting, I learned more about Bezier curves and worked on extracting the axis from a lasso region.

I asked Dr Williamson about his opinion on my overall professional conduct up to today's meeting. We reviewed my GitHub version control, meeting minutes and transcripts. The primary issue I was facing up to that point was trying to automate the axis detection and how it was taking too long and causing a roadblock, and Dr Williamson said that I should work on getting a usable application with the essentials, i.e. the rays, the calculations, the distributions and the actual goal of the project, which is to create interactive visualisations of nomograms and try to automate the manually selected features later on. These are the objectives to work on for next week.

#### **Friday 24th of November - John Williamson's office - 11 am**

##### **Tenth meeting**

Progress leading up to the meeting was working on a function to draw normal distributions on the canvas, selecting points on the canvas and entering a label for it. I also implemented data structures for storing the coordinates.

Issues discussed were regarding user interaction, Dr Williamson suggested I work on implementing direct manipulation principles, minimising popups, following the design of apps like Inkscape. Objectives agreed for the following meeting was to work on direct manipulation and distribution drawing functionality.

#### **Friday 8th of December - John Williamson's office - 11 am**

##### **Eleventh meeting**

In the week leading up to the meeting, I worked on the scope of features to implement during the Christmas break and the 13th week. The issues discussed in the meeting were regarding the dissertation and expressing my goals clearly into the paper. Objectives agreed for the first meeting in the next semester was to write up the introduction and background for the dissertation, creating an overlay for the axis on the canvas, drawing a normal distribution on top and enhancing UI functionality.

#### **Friday 19th of January - John Williamson's office - 11 am**

Progress made until the meeting was an implementation of Bezier curves, writing of the introduction, and dragging control points. Problems discussed were overall progress and time management, providing clearer feedback to users and incorporating additional visual aids, such as displaying numerical values through direct manipulation, to enhance the user experience. Aims for the following week were improving the implementation of Bezier curves, working on statistical distributions, and UI improvements.

#### **Friday 26th of January - John Williamson's office - 11 am**

Progress made up to the next meeting was using a Bezier library for drawing curves of a higher order, prototyping the new user interface, and writing the background. Issues discussed were the prototype and user interactions and the slowness of the application. The plan for the following week was to write the requirements analysis and work on statistical distributions and the user interface prototype.

#### **Friday 2nd of February - John Williamson's office - 11 am**

This week, we discussed and reviewed the requirements for the project from my dissertation section. Identified areas where more clarity or detail was needed. Dr Williamson suggested improving the description of nomograms and their functionality and clarified the difference between functional and non-functional requirements. He suggested adding more general information about nomograms and their applications. He also recommended including examples or studies to support the benefits of nomograms in various fields. We discussed progress on implementing equations and parsers for the project. He advised against over-engineering solutions and suggested keeping implementations simple and focused. We also discussed testing methods and evaluation criteria for the project. Dr W emphasized the importance of user testing to evaluate the usability and effectiveness of the software. We discussed upcoming tasks, including combining equations, working on UI features, and

implementing interactive visualizations.

#### **Friday 9th of February - John Williamson's office - 11 am**

During the recent meeting, progress on implementing various components was reviewed, including the functionality to locate points on an axis and the integration of polynomial fitting for curve graphing. Discussions also centred around enhancing the interactive visualization features and improving user instructions to ensure accurate point placement. Dr Williamson emphasised the importance of showing the computer-predicted values and suggested evaluating polynomial fitting effectiveness through MSE and streamlining user interactions. With limited time remaining, the focus for the upcoming week will be on completing the implementation phase and preparing for testing and evaluation to ensure project objectives are met efficiently.

#### **Friday 16th of February - John Williamson's office - 11 am**

Progress made in the previous week included interface improvements for easier axis name entry and control point placement, as well as the implementation of keyboard shortcuts and a side panel to display all points. However, issues arose regarding the clear display of probability densities on the UI and the interaction of isopleths for probabilistic purposes. Dr. Williamson proposed animating isopleths between random pairs of points from distributions to demonstrate probabilistic interaction and intersections. Dr Williamson recommended using JSON files and tools like PyInstaller to share probabilistic nomograms and make the application portable. Objectives for the coming week include finalizing the implementation of animated isopleths, improving the display of probability densities, exploring options for sharing the application, and drafting an evaluation plan for user testing to commence evaluations by week eight.

#### **Friday 23rd of February - John Williamson's office - 11 am**

The progress made up to seeking 7 was creating a user survey, showing the probabilities on the axis, and creating randomly generated rays. The issues we discussed were the consistency of the user survey and deciding on the nomogram to use, as well as improving the questions to give the user specific instructions on what to do, changing the answers to questions from yes or not to perfect to poor. We also discussed the generation of isopleths, being able to pick the isopleths to focus on so that users can pick how the random points are sampled.

Agreed objectives for the coming week included further UI improvements, implementing export features, and initiating the in-person user evaluation phase, after improving the user survey. The ethical checklist was signed.

#### **Friday 1st of March- John Williamson's office - 11 am**

Progress

1. Improved user interface by adding more options for categorizing data.
2. Implemented import and export functionality for nomograms using JSON files.
3. Enhanced interactivity by allowing users to move isopleths freely.
4. Added OpenCV point detection for increased accuracy.
5. Prepared for conducting user surveys, including options for remote participation.
6. Reviewed and addressed questions regarding project objectives and methodologies.

Meeting Discussions:

1. Reviewed updates made to the project, including improvements in user interface and functionality.
2. Discussed integrating distributions into interactive visualizations and potential methods for displaying data.
3. Clarified plans for conducting user surveys and analyzing collected data.
4. Explored strategies for reporting and visualizing survey results in the dissertation.

Objectives for Coming Week:

1. Conduct user surveys to gather feedback on the application.
2. Finalize GitHub repository and prepare for submission.
3. Begin writing the implementation section of the dissertation

#### **Friday 8th of March- John Williamson's office - 9 am**

Progress Made:

1. Conducted 10 user evaluations, revealing generally consistent feedback.
2. Identified user interface glitches, such as confusion with control point creation and disappearing isopleths.
3. Improved the design section of the project, including adding a home page and descriptions of nomogram construction.
4. We explored the use of least squares regression for fitting axis points and explained how axes are represented in the project.

#### Discussions and Feedback:

1. Clarified the need for a more detailed explanation in the design section regarding interaction design principles.
2. Discussed the rationale behind design choices, including not implementing user accounts in the web application.
3. Addressed questions about adding user scenarios and code listings to the dissertation.
4. Explored options for optimizing the GitHub repository structure and including executable files for the application.

#### Objectives for Coming Week:

1. Aim to have a first draft of the dissertation completed.
2. Add more detail to the implementation section, including explanations of optimization methods.
3. Consider adding docstrings for functions to improve code readability, especially if considering future professional applications.

#### **Friday 15th of March- John Williamson's office - 11 am - Final**

#### Progress Made:

1. User Interface Development: Significant progress was made in developing the user interface for the software. Various components were implemented, including control points, axis points, and curve fitting functionality.
2. Implementation Architecture: A diagram illustrating the relationship between different software components was created to provide a clearer understanding of the implementation structure.
3. Technical Justifications: Justifications for technical choices, such as the use of BCA curves, were further developed to align with project requirements and goals.
4. Evaluation Planning: Detailed planning for the evaluation phase was conducted, including task descriptions, methodology, and criteria for measuring accuracy.
5. Video Presentation Preparation: Initial preparations were made for the video presentation, outlining key content and structure.

#### Issues Discussed and Potential Solutions:

1. Clarity in Implementation Description: There was a need to provide more detailed explanations of the implementation process, particularly regarding the selection and application of different curve models. Solutions included adding clearer explanations and examples to the dissertation.
2. Accuracy Measurement Methods: Clarification was needed regarding the choice of accuracy measurement methods and their implementation. It was decided to choose one method (e.g., comparing x-y coordinates) and ensure clarity in its description and interpretation.
3. Evaluation Purpose and Methodology: The purpose and methodology of the evaluation needed to be clearly articulated at the beginning of the evaluation section. Solutions included revising the section to provide a clearer overview of the evaluation process and objectives.

#### Objectives for the Coming Week:

1. Dissertation Refinement: Refine the dissertation content to include clearer explanations of the implementation process, justifications for technical choices, and a discussion of evaluation results and their implications.
2. Video Presentation Creation: Create a concise and informative video presentation highlighting key aspects of the project, including the problem statement, software features, evaluation process, and results interpretation.
3. Evaluation Completion: Complete the evaluation process, including conducting user tests, analyzing results, and documenting findings in the dissertation.
4. Documentation Updates: Update project documentation, including diagrams, annotations, and task descriptions, to reflect any changes or additions made during the week.