



## St Edmund's College

### Senior Assessment Information and Conditions

Focus of the task	
Terms/Prior knowledge	R Studio basics, Data manipulation with dplyr, Stanford Design Thinking process, Supervised learning concepts, Basic statistics
Skills:	Implementing machine learning models (decision trees or K-nearest neighbors), Creating interactive web applications with Shiny, Data preparation and analysis, User interface design

The task
You have been approached by talent scouts from the Australian Institute of Sport who need a tool to help identify athletic potential during their high school visits. The scouts need to assess hundreds of students efficiently and want data-driven recommendations about which sports individual students might excel in. You've been tasked with developing a machine learning application that analyses physical attributes and basic skills to predict sporting potential. This tool will streamline the talent identification process and provide evidence-based recommendations that scouts can use in the field.

Task Instructions
<p><b>STEP 1: Empathise and Define</b></p> <p><b>Work in pairs or groups of three to:</b></p> <ul style="list-style-type: none"><li>Put yourself in the shoes of AIS talent scouts to understand their challenges and needs. Create either an empathy map or user persona that reflects this understanding.</li><li>Develop a problem statement following Stanford Design Thinking principles.</li><li>Identify which sports your tool will focus on. (Minimum of 5 options)</li><li>Determine key physical and performance attributes for these sports.</li><li>Evaluate the AIS dataset and find another appropriate dataset. Kaggle has a lot of athlete metrics datasets that could be used.</li><li>Create a table that records the following based on your evaluation of the data:<ul style="list-style-type: none"><li>Quality issues, e.g. missing values, outliers etc</li><li>Limitations of the data</li><li>Potential biases in the data</li><li>Steps needed to clean the data</li></ul></li></ul> <p>Make sure you have a minimum of three dot points for each entry.</p> <p><b>What you need to submit -</b></p> <ol style="list-style-type: none"><li>Empathy Map OR User Persona</li><li>Problem Statement</li><li>Data Evaluation Table</li></ol>
<p><b>STEP 2: Prototype</b></p> <p><b>Work in pairs or groups of three to:</b></p> <ul style="list-style-type: none"><li>Clean and prepare your datasets based on your evaluation. You must document this process using screenshots or code snippets.</li><li>Create a simple classification model that recommends the most suitable sport from two options with 3 attributes as predictors.</li><li>Test both decision tree and K-nearest neighbours approaches to determine which works better.</li><li>Identify which model you will use for your assignment and plan how you will expand your prototype to include at least 5 sports.</li></ul>

<ul style="list-style-type: none"> <li>Meet with your teacher to discuss your prototyping, expansion plans and justification for choice of model. You must take notes from this meeting.</li> </ul> <p><b>What you need to submit -</b></p> <ol style="list-style-type: none"> <li>Data Cleaning Documentation</li> <li>Comparison table of models (include 5 points). Statement outlining which model you will use and 2 sentence justification for choice of model.</li> <li>Plan for final assignment. Notes from Teacher conference.</li> </ol>
<p><b>STEP 3: Development</b></p> <p><b>Work individually to:</b></p> <ul style="list-style-type: none"> <li>Create your machine learning model</li> <li>Test your model and refine it to ensure that it functions as expected</li> <li>Include confidence levels for sport recommendations</li> <li>Develop a Shiny interface that allows for user input</li> <li>Refine your interface to ensure that it is appropriate for its purpose and audience.</li> </ul> <p><b>What you need to submit -</b></p> <ol style="list-style-type: none"> <li>R Code Files</li> <li>Testing and Training data</li> </ol>
<p><b>STEP 4: Evaluation</b></p> <p><b>Work individually to:</b></p> <p>Create a short video (3-5 mins) that demonstrates your model in action using the Shiny interface. Your video should also include:</p> <ul style="list-style-type: none"> <li>Explanation of your design decisions, e.g. Why you chose the machine learning model you did and how it has made your model more effective, design of Shiny interface</li> <li>Explanation of the main elements of your code</li> <li>Any limitations of your model</li> <li>How you used resources including, external sources, your other group member/s, AI to create your model</li> <li>Reference List</li> </ul> <p><b>What you need to submit -</b></p> <ol style="list-style-type: none"> <li>Final Video Presentation</li> </ol>

Assessment criteria
<p>You will be assessed on the following:</p> <ul style="list-style-type: none"> <li>Knowledge and Understanding</li> <li>Skills</li> </ul>

Submission requirements
<p><b>Group Tasks</b></p> <ul style="list-style-type: none"> <li>Empathy Map OR User Persona</li> <li>Problem Statement</li> <li>Data Evaluation Table</li> <li>Data Cleaning Documentation</li> <li>Comparison table of models (include 5 points). Statement outlining which model you will use and 2 sentence justification for choice of model.</li> <li>Plan for final assignment. Notes from Teacher conference.</li> </ul> <p><b>Individual Tasks</b></p> <ul style="list-style-type: none"> <li>R Code Files that include machine learning model and Shiny application</li> <li>Testing and Training data</li> <li>Final Video Presentation</li> </ul>

Criteria	Outstanding Achievement	High Achievement	Satisfactory Achievement	Partial Achievement	Limited Achievement
Knowledge and Understanding – Empathise 8 marks	Develops a highly detailed and insightful empathy map or user persona, demonstrating a deep understanding of AIS talent scouts' needs with strong supporting evidence.	Develops a detailed and clear empathy map or user persona that effectively represents user needs with some supporting evidence.	Develops a basic empathy map or user persona that correctly represents user needs but lacks depth or supporting evidence.	Empathy map or user persona is incomplete or lacks a clear connection to the user's needs.	No empathy map or persona provided or does not relate to the task.
Knowledge and Understanding – Define 5 marks	Defines a clear, user-centric problem statement that directly addresses the needs and challenges of AIS scouts. Well-structured, concise, and supported by evidence.	Defines a relevant and structured user-centric problem statement with minor gaps in clarity or supporting details.	Meets requirements by outlining a basic problem statement that is relevant to the user's needs.	Problem statement is unclear, generic, or lacks a clear connection to user needs.	No problem statement provided, or it does not address the user's needs.
Knowledge and Understanding – Data Evaluation 7 marks	Critically evaluates the dataset with at least three well-explained entries for each category (quality issues, limitations, biases, cleaning steps). Uses strong justification and evidence.	Evaluates dataset effectively, providing three entries per category with reasonable explanations.	Meets requirements by providing a table that includes three basic points per category with minimal justification.	Provides a basic table but some entries are missing or lack clarity. No real evaluation of biases or limitations.	No or minimal dataset evaluation provided.
Skills - Data Cleaning 5 marks	Clearly documents all data cleaning steps with well-structured screenshots or code snippets. Justifies decisions effectively.	Documents data cleaning process with minor gaps in justification or structure.	Meets requirements by outlining data cleaning steps with some supporting screenshots or explanations.	Limited documentation with unclear steps or missing key details.	No or minimal data cleaning documentation provided.
Skills – Model comparison, selection and expansion plan 10 marks	Critically compares decision tree and KNN models with at least five well-explained points. Clearly justifies the final choice with a strong rationale. Presents a well-structured and feasible plan for model expansion with excellent justification	Compares models with five strong points, providing reasonable justification for the final choice. Presents a clear expansion plan with strong justification.	Meets requirements by providing a basic comparison with five points and stating the model choice with some rationale. Presents a satisfactory expansion plan with satisfactory justification.	Limited comparison with unclear points. Justification for the model choice is weak. Presents a satisfactory expansion plan but justification lacks clarity or depth of thought	No model comparison or unclear selection. Plan is unclear, unrealistic, or lacks justification.

Skills – Machine Learning Model Implementation 15 marks	Implements a fully functional machine learning model using decision tree or KNN. Correctly prepares and applies training/testing data. Model makes logical, consistent, and well-structured predictions that align with sporting potential. Handles data efficiently and adapts to different inputs.	Implements a functional model with strong accuracy and data handling. Uses training/testing data correctly, and predictions are logical with only minor inconsistencies. Handles data well, though minor optimisations could improve efficiency.	Meets requirements by implementing a working model that classifies data and makes predictions. Accuracy may be inconsistent, or data handling may not be fully optimised. Model may require small manual adjustments.	Model is incomplete or has errors that affect predictions. Training/testing data handling is incorrect or unclear. Results may not be reliable or meaningful.	Model attempts to classify data but is highly inaccurate, incomplete, or missing key steps in training/testing data handling. Runs but does not work correctly.
Skills – Code Structure & Efficiency 10 marks	Code is well-structured, efficient, and fully functional. Runs without errors and processes data correctly. Clearly commented, with meaningful variable names and well-organised functions. Code is optimised for readability and efficiency.	Code is well-structured and mostly efficient, with only minor inefficiencies. Runs correctly with minimal errors. Comments are mostly clear, with some sections needing small improvements.	Meets requirements by implementing a functional structure with comments. Code may have minor inefficiencies, readability issues, or lack detailed explanations. Runs correctly but could be better organised.	Code has errors or inefficiencies. Limited comments, making it difficult to follow. May require manual corrections to run properly.	Code is disorganised or difficult to follow, with significant errors or missing sections. May run with errors or require manual fixes to function.
Skills - User Interface & Design Shiny App 12 Marks	Develops a fully functional, user-friendly interface with a clear layout, logical flow, and effective input/output elements. Allows users to input key attributes and receive sport recommendations. Layout is professional, intuitive, and well-structured for usability	Interface is well-designed, functional, and mostly user-friendly. Layout is mostly clear, with minor usability issues. Some design choices could be further refined.	Meets requirements by creating a working interface, but layout is basic, labels may be unclear, or usability is not fully optimised. Some elements may not align well.	Interface partially works but has missing, broken, or confusing elements. Layout may be unclear, making the tool difficult to use.	Interface is minimal or has major issues. Some elements may be present but do not function as intended.
Skills - Functionality & Integration 8 Marks	Seamlessly integrates the machine learning model into the Shiny app. Inputs are processed correctly, and	Successfully integrates the model with minimal errors in input processing or output display. Data flows	Meets requirements by connecting the model to the app, but output may not be clear or effective.	Integration is incomplete or has major errors that prevent correct predictions. Some	Some attempt is made to integrate the model, but it does not work

	output is displayed in a meaningful way. Code is efficient and well-structured. User interactions are smooth, and data flows correctly.	well, but small refinements could improve efficiency.	Some errors or inefficiencies may be present.	functionality is missing or broken.	properly. Outputs may be incorrect or missing.
Video Presentation	Presents a well-organised, engaging, and professional video (3-5 mins). Clearly explains the machine learning model, Shiny app, and key design choices. Provides a strong justification for decisions, demonstrates understanding of training/testing data, and walks through the key code components. Uses visuals effectively and maintains a logical flow.	Presents a structured and clear video, covering the machine learning model, Shiny app, and design choices with mostly well-explained justifications. Demonstrates a solid understanding of training/testing data and code, but may have minor gaps in reasoning or clarity. Visuals and explanations are effective, but flow of presentation could be slightly improved.	Meets requirements with a structured video that covers key points but lacks depth in explanations or justifications. Describes the model, app, and training/testing data, but some details may be unclear or underdeveloped. Flow of presentation is mostly logical but may feel rushed or inconsistent.	Presentation misses key explanations or lacks structure, making some sections difficult to follow. Explanations of code, data handling, or predictions are too brief or unclear. Justifications for decisions are weak or missing.	Video is incomplete, missing major explanations, or difficult to understand. Lacks discussion of key concepts such as training/testing data, code structure, or model functionality.