# **Chapter 3 - Literature Review**

This project requires familiarity with the topics of Deep Learning and Computer Vision, thus extensive research is required for the project development. Research papers had a large impact on how to undertake the project in terms of collecting, recording, and presenting data. Guides helped understand the libraries used and begin the coding process.

Research forms a major component for the project development.

## **3.1. Deep Learning:**

Deep learning is a subset of machine learning that has made great strides in all the fields that have used it. Whether it is in object detection or classification, speech recognition and in many other domains. Deep learning has been very successful because it can be fed raw data and can extract its own representation of it using different levels of abstraction, unlike in conventional machine learning system where representations are hard coded in, which makes them limited (Lecun et al, 2015). A machine learning model goes through 2 phases, a training phase and a testing phase. The training phase is when the model learns the data and the testing phase is comparing the model’s predictions against the true labels on never seen before data (test data). What are being trained are the model’s weights, which define the input output function.

Deep learning is a subfield of machine learning where

Supervised learning is a form of machine learning that allows us to dynamically correct the model’s predictions while training by providing the correct/desired prediction. Assume the task is to classify between 3 different cat types, during training the model will make a prediction as to what the type is, the prediction produced will be a set of scores for each type of cat (classes). Provided the correct set of score the model will then adjust its weights appropriately using the weight’s gradient and an error function to find which direction to change the weights to have the lowest possible error produced, this is called gradient descent (Goodfellow et al, 2016).

### **3.1.1. Gym Buddy**

### Gym Buddy is a free-to-use application available across both iOS and Android platforms. Primary features include: a gym search whereby users can search for gyms however the search is narrowed to show private partnered gyms or health clubs. Gym users can also socially interact with other users through an in-built messaging platform as well as share their healthy lifestyle habits by posting pictures on their individual news feed. Overall though this application offers many advanced features it is proposed as a social platform than to be informative which the intended app for the project aims to avoid. The one coach app aims to expand on gym search exclusivity to allow search for both public and private gyms.

### **3.1.2 Gym Journey**

Gym Journey is a freemium application available only on iOS platform. This app offers gym users the ability to create a customised workout plan whereby users are able to select and group exercises from a library of 1,800 exercises ranging from cardio to weight training. Also feature a digital measure for individuals health characteristics thus helping to keep track and observe metric measurements of weight and BMI over time. The one coach app aims to replicate these functionalities however focused aim is to narrow the exercise library for simplicity also to feature push notifications that encourages users to work out.

## **3.2. Project Planning and Design**

### **3.2.1. UML Implementation**

Arlow’s literature on Object-Oriented Analysis and Design provided a very through explanation on the different design processes and documents that would be required during project design stages. The literature highlighted how to create Use Case Diagrams and Entity Diagrams specifically which the author would create during the later stages of the project to model how both the front and back end of the application would be modelled.

## **3.3. Tools and Libraries for Development**

Listed below are all the tools and libraries used for the development of the project.

### **3.3.1. X-Code 12.4**

X-Code is Apple's Integrated Development Environment (IDE) used to develop software for MacOS, iOS, iPadOS, WatchOS, and TvOS. X-Code includes Command Line Tools (CLT), which enable UNIX-style development via the Terminal app in MacOS. With Swift language only being compatible with X-Code the author had to adapt to learn how to use the environment.

**Source:**  
*Xcode - Apple Developer*. [online]  
Available at: <https://developer.apple.com/xcode/>   
[Accessed 5 February 2021].

### **3.3.2. Swift UI (2.0)**

SwiftUI is an innovative and simple way to build user interfaces across all Apple platforms. Interfaces can be built for any Apple device using just one set of tools and APIs. With a declarative Swift syntax that’s easy to read and natural to write, SwiftUI works seamlessly with X-Code design tools to maintain code cleanliness.

**Source:**

*Apple Developer Documentation*. [online]   
Available at: <https://developer.apple.com/documentation/swiftui/>  
[Accessed 5 February 2021].

### **3.3.3. Firebase (Back-End Database)**

The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in real-time to every connected client. When you build cross-platform apps with iOS, Android, and JavaScript SDKs, all clients would share one Realtime Database instance and automatically receive updates with newest data.

**Source:**

*Firebase Realtime Database*. [online]   
Available at: <https://firebase.google.com/docs/database>   
[Accessed 5 February 2021].

## **3.4. Third-Party Resources**

Listed below are all the third-party resources used to assist the project development.

### **3.4.1. Apple Developer Documentation**

Online documentation that provides a supported guide for each component of Apple’s developing environment. Highlighting tutorials, sample code and API references for all apple devices from iPhone to Mac applications. This documentation is continually updated by Apple and author found it reliable to stay informed about latest releases.

**Source:**

*Apple Developer Documentation*. [online]   
Available at: <https://developer.apple.com/documentation/>   
[Accessed 5 February 2021].

### **3.4.2. Udemy**

Udemy is an online learning and teaching marketplace that hosts an extensive list of educational courses. These courses offer step-by-step guided teaching tutorials and support from industry professionals and global coding community. Udemy offered an iOS development course highlighting video tutorials for Swift UI and X-Code.

**Source:**

Udemy. Online Courses - Learn Anything, On Your Schedule [online]   
Available at: <https://www.udemy.com/>   
[Accessed 5 February 2021].

### **3.4.3. Stack Overflow**

Stack Overflow is an open community forum for anyone that codes. Users can search and respond to questions regarding a range of software development queries. A search query for Apple’s developing environment (Swift, X-Code & API’s) brought up a large collection of pre-existing questions that had been answered by multiple users. Overall, this forum proved to being a valuable resource throughout this project.

**Source:**Stack Overflow - Where Developers Learn, Share, & Build Careers. [online]   
Available at: <https://stackoverflow.com/>   
[Accessed 5 February 2021].