Information Review

Existing Gesture Recognition Solutions

(Munir Oudah, 2020)

A good overview of possible techniques that can be applied to gesture recognition problems. For example, wearables, colour recognition, key points, and deep learning. Useful for realising the range of approaches that can be taken to the problem area as well as some possible applications for hand gesture recognition.

(Zhi-hua Chen, 2014)

Image segmentation approach to gesture recognition. Interesting approach using processing steps that could simplify the problem for a learning algorithm.

(Wachs, 2011)

Details research into applications and approaches to gesture recognition as well an analysis of problems that arise with each approach.

Learning Algorithms

(Navlani, 2019)

Overview of Support Vector Machines. a good starting place for understanding how learning algorithms work with images. Will likely need a more complex algorithm to handle object detection.

(Mallick, 2016)

Good breakdown of how feature extractors learn features from an image. Fundamental to low level feature learning. These features should be already learned if using a pre-trained network but this page has further chapters on how ANN's and CNN's classify images.

(Christian Szegedy, 2017)

Report on the usefulness of residual networks when training data gets large. Could be useful If experiencing vanishing/exploding gradient.

(Ruder, 2016)

A mathematical overview of many different optimization algorithms. Useful in pointing out the strength's weakness of each algorithm. Adam seems to be a good starting point due to its effectiveness in many general scenarios.

Tools and Techniques

(Nitish Srivastava, 14)

In depth research into the effects of dropout on various neural networks. Might be useful if I find my model is overfitting on the training set.

(Rosebrock, 2017)

How to use pre-trained modals for object detection in OpenCV. Object detection might be needed to detect the hand and isolate the region of interest. Also gives simple insights into the use cases for each model.

(Kapkar, 2020)

Step by step how to use Google Cloud GPU for TensorFlow object detection. Will be useful if CPU training is not sufficient.

(Geron, 2019)

Great book for end to end machine learning, will be a good reference for anything technical or useful libraries like scikit-learn.

(Brownlee, 2019)

In depth description of possible application of 1x1 convolutions. Could be useful to reduce dimensionality of the output from a hidden layer.

Pre-trained models

(Dollar, 2015)

Common Object in Context dataset (COCO). Huge Microsoft dataset of annotated objected that can be used to train models. Many pre-trained object detectors use this dataset, and it seems a good fit for the problem of gesture recognition due to the type of images used.

(Joseph Redmon, 2016)

Original YOLO paper. Seems to promise high inference speed. Could be worth looking at newer iterations of YOLO if inference speed is too slow. First version is probably not accurate enough for this project. Lots of useful architecture details to reference when implementing.

(Peng Liu, 2019)

Similar project of gesture recognition. This project uses a Single Shot Detector to a high level of accuracy while maintaining high inference speed (30ms). Seems like an efficient approach for gesture recognition for moderate amounts of data.

(Wei Liu, 2015)

Original SSD paper. Trained on the COCO dataset. In depth description of the architecture, techniques used and evaluation of performance of the model on various datasets. Some good comparisons to other algorithms such as YOLO and Faster R-CNN.

(Gandhi, 2018)

Explains the evolution of R-CNN, Fast R-CNN and Faster R-CNN.

(Rey, 2018)

Architecture overview of Faster R-CNN for object detection. Explains what steps are taken to get the final output of bounding box and probabilities. Good descriptions of Non-Max Suppression, RoI proposals, Anchors and Mean Average Precision

Bibliography

Brownlee, J. (2019, April 29). *A Gentle Introduction to 1×1 Convolutions to Manage Model Complexity*. Retrieved from Machine Learning Mastery: https://machinelearningmastery.com/introduction-to-1x1-convolutions-to-reduce-the-complexity-of-convolutional-neural-networks/

Christian Szegedy, S. I. (2017). *Inception-v4, Inception-ResNet and the Impact of Residual Connections on Learning.* AAAI Conference on Artificial Intelligence.

Gandhi, R. (2018, 07 9). *R-CNN, Fast R-CNN, Faster R-CNN, YOLO — Object Detection Algorithms*. Retrieved from Towards Data Science: https://towardsdatascience.com/r-cnn-fast-r-cnn-faster-r-cnn-yolo-object-detection-algorithms-36d53571365e

Geron, A. (2019). *Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems.* OReilly; 2nd New edition.

Joseph Redmon, e. a. (2016). *You Only Look Once: Unified, Real-Time Object Detection.* Washington: Computer Vision Foundation.

Kapkar, N. (2020, 09 21). *tensorflow-2-object-detection-api-with-google-colab*. Retrieved from Medium: https://medium.com/swlh/tensorflow-2-object-detection-api-with-google-colab-b2af171e81cc

Mallick, S. (2016, December 6). *Histogram of Oriented Gradients*. Retrieved from learn openCV: https://www.learnopencv.com/histogram-of-oriented-gradients/

Mark Sandler, A. H.-C. (2018). *MobileNetV2: Inverted Residuals and Linear Bottlenecks.* IEE Computer Society Conference on Computer Vision and Pattern Recognition.

Munir Oudah, A. A.-N. (2020). *Hand Gesture Recognition Based on Computer.* Baghdad, Mawson Lakes: Journal of Imaging.

Navlani, A. (2019, December 27). *Support Vector Machines With Scikit-Learn*. Retrieved from Data Camp : https://www.datacamp.com/community/tutorials/svm-classification-scikit-learn-python

Nitish Srivastava, G. H. (14). *Dropout: A Simple Way to Prevent Neural Networks from Overfitting.* Toronto, Ontario: Journal of Machine Learning Research.

Peng Liu, e. a. (2019). Hand Gesture Recognition Based on Single-Shot Multibox Detector Deep Learning. *Hindawi*.

Rey, J. (2018, 01 18). *Faster R-CNN: Down the rabbit hole of modern object detection*. Retrieved from Tryo Labs: https://tryolabs.com/blog/2018/01/18/faster-r-cnn-down-the-rabbit-hole-of-modern-object-detection/

Rosebrock, A. (2017, September 11). *Object detection with deep learning and OpenCV*. Retrieved from pyimagesearch: https://www.pyimagesearch.com/2017/09/11/object-detection-with-deep-learning-and-opencv/

Ruder, S. (2016, January 19). *An overview of gradient descent optimization algorithms*. Retrieved from Ruder.io: https://ruder.io/optimizing-gradient-descent/

Wei Liu, D. A.-Y. (2015). *SSD: Single Shot MultiBox Detector.* Cornelll: Cornell University.

Zhi-hua Chen, J.-T. K.-B. (2014). Real-Time Hand Gesture Recognition Using Finger Segmentation. *The Scientific World Journal*.

Information Review:

Conferences:

P. Darshna, "Music recommendation based on content and collaborative approach & reducing cold start problem," *2018 2nd International Conference on Inventive Systems and Control (ICISC)*, **Coimbatore, 2018, pp. 1033-1037, doi: 10.1109/ICISC.2018.8398959.**

Talks about the problems recommendation systems can face and how to overcome them. In addition, it explains the common methodologies used to achieve accurate recommendation of soundtracks.

B. Marshall, "Aggregating music recommendation Web APIs by artist," 2010 IEEE International Conference on Information Reuse & Integration, Las Vegas, NV, 2010, pp. 75-79, doi: 10.1109/IRI.2010.5558960.

Addresses the problems with inconsistent results through music recommendation web APIs such as 'lastFm', 'EchoNest' and 'Idiomag'. Focuses on identifying similar artists of tracks when calculating the predictions, and artist collaborations for each soundtrack.

Kunhui Lin, Zhentuan Xu, Jie Liu, Qingfeng Wu and Yating Chen, "Personalized music recommendation algorithm based on tag information," *2016 7th IEEE International Conference on Software Engineering and Service Science (ICSESS)*, **Beijing, 2016, pp. 229-232, doi: 10.1109/ICSESS.2016.7883055.**

Goes into the logical details of improving a personalized soundtrack recommendation algorithm with useful formulas to increase the accuracy of recommendation by collecting tag information of each soundtrack and associating this with tags of user's preferences, useful for content-based recommendation.

E. Shakirova, "Collaborative filtering for music recommender system," *2017 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus)*, **St. Petersburg, 2017, pp. 548-550, doi: 10.1109/EIConRus.2017.7910613.**

Explains the goals of a collaborative filtering approach to recommend items in detail and outlines the sub approaches such as user-based and item-based filtering. In addition, it explains the similarity functions such as cosine-metric and outlines why this is a suitable function to for calculating similarity.

V. Gavriilidis, A. Tefas, C. Kotropoulos and N. Nikolaidis, "Enhanced similarities for a music Recommender System," *2016 Digital Media Industry & Academic Forum (DMIAF)*, **Santorini, 2016, pp. 113-116, doi: 10.1109/DMIAF.2016.7574913.**

Shows an experiment conducted with the 'lastfm' music dataset, explaining the enhanced formulas with results in a graphical representation that shows the success of matrix factorisation and addresses the data sparsity problem which can reduce the efficiency of recommendation methods.

Journals:

A. Elbir and N. Aydin, "Music genre classification and music recommendation by using deep learning," in *Electronics Letters***, vol. 56, no. 12, pp. 627-629, 11 6 2020, doi: 10.1049/el.2019.4202.**

Explains the Genre classification of soundtracks using deep learning with studies performed on a dataset explaining the classification accuracy, performance evaluation and recommendation similarity, represented in tables and graphs.

Xuan Zhu, Yuan-Yuan Shi, Hyoung-Gook Kim and Ki-Wan Eom, "An integrated music recommendation system," in *IEEE Transactions on Consumer Electronics***, vol. 52, no. 3, pp. 917-925, Aug. 2006, doi: 10.1109/TCE.2006.1706489.**

Further experiments showing a 'confusion matrix' method to classify large amounts of genres and ensuring the prediction calculation is accurate and precise.

M. Nguyen and Y. Cho, "A Hybrid Generative Model for Online User Behavior Prediction," in *IEEE Access***, vol. 8, pp. 3761-3771, 2020, doi: 10.1109/ACCESS.2019.2962539.**

Uses a hybrid approach with a model that combines collaborative filtering with content-based filtering for more accurate recommendations and to predict the user behaviour.

Books:

Reynders, F. (2018). *Modern API Design with ASP.NET Core 2 Building Cross-Platform Back-End Systems* **. Apress. https://doi.org/10.1007/978-1-4842-3519-5**

Useful book which explains about designing web APIs specifically for ASP.NET Core web applications. In addition, it explains about the architecture, error handling, securing, and testing of APIs which will be useful later during the development stage. Furthermore, it explains the difference between ASP.NET Framework and .NET Core outlines which framework is suitable for development of a project.

Lakshmiraghavan, B. (2013). Practical ASP.NET Web API. In *Practical ASP.NET Web API* **(1st ed.). Apress. https://doi.org/10.1007/978-1-4302-6176-6**

Shows code demonstrations of developing, hosting, and consuming a Web API and alongside this shows performance enhancement techniques.

Articles:

Beheshti, Y. (2020). Towards Cognitive Recommender Systems. *Algorithms***,** *13*(8), 176–. https://doi.org/10.3390/a13080176**

Explains the many types of recommendation systems apart from the most popular methods and the situations they would be suitable for, and how some of them can be combined.

Pichl, Z. (2017). Understanding User-Curated Playlists on Spotify: A Machine Learning Approach. *International Journal of Multimedia Data Engineering and Management (IJMDEM)***,** *8*(4), 44–59. https://doi.org/10.4018/IJMDEM.2017100103**

Details Spotifys' approach to generate recommended soundtracks in a playlist for a user based on their behaviour.

Thorat, P. B., Goudar, R. M., & Barve, S. (2015). Survey on collaborative filtering, content-based filtering and hybrid recommendation system. *International Journal of Computer Applications, 110*(4), 31-36.**

Shows table of popular sites using a recommendation system such as 'Netflix' and 'Amazon' and outlines the benefits and limitations of the recommendation approaches such as Collaborative filtering and content-based filtering.

Websites:

Bowes, J. (2015, July 21). *Kanban vs Scrum vs XP – an Agile comparison.* **Retrieved from Manifesto: https://manifesto.co.uk/kanban-vs-scrum-vs-xp-an-agile-comparison/**

Explains the differences and similarities between the popular Agile frameworks such as Kanban, Scrum and Extreme programming (XP), outlines the benefits and limitations.

Cohen, E. (2019, July 14). *The Definitive Guide to Project Management Methodologies.* **Retrieved from Workamajig: https://www.workamajig.com/blog/project-management-methodologies**

Explains the different project management methodologies with example and benefits and limitations and explains the justification of choosing the most suited methodology for a project.

Dataaspirant. (2015, March 13). *An Introduction to Recommendation Engines.* **Retrieved from dataconomy: https://dataconomy.com/2015/03/an-introduction-to-recommendation-engines/**

Explains about recommendation engines in general outlining the most important points regarding data filtering techniques.

Ismail, K. (2018, December 3). *Trello vs. Asana: Battle of the Freemium Project Management Tools.* **Retrieved from cmswire: https://www.cmswire.com/digital-workplace/trello-vs-asana-battle-of-the-freemium-project-management-tools/**

Explains the differences between a more sophisticated project planning tool (Asana) with a more traditional user-friendly tool (Trello).

Kukhnavets, P. (2018, March 18). *Advantages and disadvantages of Extreme Programming (XP).* **Retrieved from Hygger: https://hygger.io/blog/disadvantages-and-advantages-of-extreme-programming/**

Goes into detail, regarding the Extreme Programming framework of the Agile Methodology and what project it is suited for.

Nash, B. (2020, April 7). *Agile vs Waterfall: Learn the Differences in 5 Minutes.* **Retrieved from trust radius: https://www.trustradius.com/buyer-blog/difference-between-agile-vs-waterfall**

Explains the main differences between the two most popular software methodologies Waterfall and Agile.

Rehkopf, M. (n.d.). *Kanban vs. scrum: which agile are you?* **Retrieved from atlassian: https://www.atlassian.com/agile/kanban/kanban-vs-scrum**

Comparison of Kanban and Scrum and outlines the benefits and limitations of each, which helps justify the suitable framework to choose for a project, such as continuous improvement and flexibility.

Information Review

<u>Research Papers</u>

Dominik Roeck, Henrik Sternberg & Erik Hofmann (2020).

Distributed ledger technology in supply chains: a transaction cost perspective

International Journal of Production Research, 58:7, 2124-2141, DOI: 10.1080/00207543.2019.1657247

Available: https://www.tandfonline.com/doi/full/10.1080/00207543.2019.1657247

Information on benefits of distributed ledger technologies (DLT) within supply chains, such as an improvement of transaction cost economics between firms through disintermediation at stages of the supply chain.

F. Bencic and I. Zarko, (2018).

Distributed Ledger Technology: Blockchain compared to Directed Acyclic Graph

IEEE 38th International Conference on Distributed Computing Systems : Vienna - Austria Available: https://ieeexplore.ieee.org/abstract/document/8416434

Paper which analyses directed acyclic graphs (DAG) in the context of distributed ledgers, and compares these to blockchain based solutions. Consider however that the paper focuses on Nano as the DAG technology, as opposed to IOTA which the project is focusing on. It also focuses on features of DLT that are relevant to distributed systems.

N. Vadgama, (2018).

Distributed Ledger Technology in the Supply Chain

Blockchain.cs.ucl.ac.uk

Available:http://blockchain.cs.ucl.ac.uk/wp-content/uploads/2019/08/DLT-in-the-Supply-Chain_UCL-CBT.pdf

Informative, extended research paper detailing how distributed ledger technology can/will impact supply chains in the future. Includes content from several contributors covering DLT as a whole, as well as in-depth analysis of its use cases in supply chains. Mainly focuses on blockchain, but a large amount of the information/research is also applicable to DAG.

Li, Yixin & Cao, Bin & Peng, Mugen & Zhang, Long & Zhang, Lei & Feng, Daquan & Yu, Jihong. (2019).

Direct Acyclic Graph based Blockchain for Internet of Things: Performance and Security Analysis

Available: https://arxiv.org/pdf/1905.10925.pdf

Detail on how DAG actually works, including deep performance and security analysis. Very important in the case of supply chains where if in use, the ledger would require very high transaction throughput and must be secure in order to ensure that the information supplied to the clients viewing the transactions is true. Also details potential consensus protocols for DAG

F. Weisenberger and F. de Knegt, (2019)

DAG - A potential game changer in the field of M2M communication

Bearingpoint.com

Available: https://www.bearingpoint.com/files/DAG_Technology.pdf?download=0&itemId=562844

Information on how distributed ledgers, DAG in particular, will likely impact the M2M economy in the future. It also covers topics relating to the question of data access and security within the growing internet of things (IOT).

E.Olgac, (2018)

Directed Acyclic Graphs, Data-Flow and Distributed Ledgers

Available:https://www.researchgate.net/publication/326834665_Directed_Acyclic_Graphs_Data-Flow_And_Distributed_Ledgers

Research and information specifically on DAG's and how transactions work within a distributed ledger built on this system. Also includes a detailed overview of how these transactions can contain measures to prevent fraud being committed on the ledger.

Articles

M.Thake, (2018)

What is DAG Distributed Ledger Technology?

Available: https://maxthake.medium.com/what-is-dag-distributed-ledger-technology-8b182a858e19

Brief introduction to DAG as an alternative to blockchain, which also relies on DLT. Also gives a small explanation of how DAG's offer the benefits of blockchain, with better performance in transaction speed and scalability.

Technical Information

S. Popov, (2019)

IOTA: Feeless and Free - IEEE Blockchain Initiative

Blockchain.ieee.org

Available: https://blockchain.ieee.org/technicalbriefs/january-2019/iota-feeless-and-free

Introductory description of how the IOTA system works, including information about the tangle. It also covers how IOTA's tangle offers advantages over existing DLT solutions due to its DAG design and ability to increase transaction speed with more scale unlike blockchain technologies, where scale can cause a decrease in transaction speed.

IOTA Official Website - Client Libraries

IOTA - Technical Documentation, Version 1.0 (latest)

Available: https://docs.iota.org/docs/client-libraries/1.0/overview

Official documentation from the IOTA foundation with detail on how to use the IOTA system and interact with an instance of the Tangle. Includes documentation for various languages. This will be useful when developing the project deliverables, as it provides an insight into the skills/knowledge that will be needed to develop my specification into an actual working solution.

Node.js Official Website - Docs

API Reference Documentation - (latest)

Available: https://nodejs.org/en/docs/

Official documentation for Node.js. I will be using this framework to help with interaction between a user of my system and an instance of the IOTA Tangle. Node.js provides useful server-side functionalities for the Javascript language, which is the best way to implement my solution.

Existing solutions related to the project

S.Jegelka, (2019)

Implementing an IOTA based Supply Chain Documentation

Medium

Available: https://medium.com/topocare-x-iota/implementing-an-iota-based-supply-chain-documentation-cd8103bcec46

This is an example of an existing implementation of IOTA to track supply chains. This is fairly similar to what my solution is looking to accomplish, however this is more supplier-focused. The example given uses masked authenticated messaging to transfer all information regarding a product between suppliers in an IOTA based focused system.

IOTA Official Website (n.d.)

IOTA Trademo - Container Tracking Demonstration

Available: https://tradedemo.iota.org/#/login

IOTA-focused container tracking solution, using the Tangle to record transactions between different 'agents' that interact with a product throughout the shipping process. Allows you to back-view which agents have interacted with a product to see who has been responsible for it at various stages of the supply chain.

Examples of where supply chain tracking is in demand

Leading Edge Only (n.d.)

Fujitsu - Fraud

Available: https://www.leadingedgeonly.com/network/fraud

Request by company for solutions to prove the integrity of a product and where said product has travelled. This is an example of where my project is applicable and needed in the real world. The requirements of this request line up with the aims of my project, such as demonstrating the history of the supply chain of a product.

Information Review

Research

Money D and Thurman S. (2002). Inclusive communication - coming soon near you?

This is a research paper from the same author of the research for where the Means, Reasons and Opportunity model was produced. This paper goes into what the model was about, why it was made, and how it works and how it was developed. This is a great insight to where the original resources came from.

Fajardo-Flores, S. B., Gaytán-Lugo, L. S., Santana-Mancilla and P. C. Rodríguez-Ortiz, M. A. (2017). Mobile Accessibility for People with Combined Visual and Motor Impairment: A case Study

This research focuses on the combined struggles of people that have combined visual and motor impairment and the mobile accessibility available. Good resource to look into how certain users may have more than a single disability and I need to make sure different features work together to provide the most accessibility in my app.

O'Neill, P. R. (2006). Enhancing electronic assistive technology prescription. Sheffield Hallam University, Sheffield, UK

This research paper has a lot of information of different accessibility topics including the use of switch access. Another great resource for me to use to greater my understanding of the underlining topic of my research.

Articles

Emerson, A., Jackie, D. (2013). Accommodating to motor difficulties and communication impairments in people with autism: the MORE intervention model. University of Nottingham, Nottingham, UK

Article that talks about the MORE model, a model produced very similar to the means, reasons, and opportunities model. This provides further information in the area of my study.

Thurman, S. (2005). Without words – meaningful information for people with high individual communication needs. Nottinghamshire Healthcare NHS Trust, Nottingham, UK

Good article outlining why it's important to make information accessible for all. Talks about people with high individual communication needs and how they communicate differently as well as what their specific needs are. Again this is the same author who worked on the original resources so their insight into the topic is great.

Online Resources

Communication Matters. (n.d). What is AAC?. Retrieved from www.communicationmatters.org.uk: https://www.communicationmatters.org.uk/overview/

A great website that covers a wide range of different accessibility topics, mainly focusing on Augmented and Alternate Communication (AAC). It provides a great set of resources and information for me to learn all about AAC. For someone like myself who doesn't know a lot about the topic of accessibility, the communication matters website is a great place to start to expand and build on my knowledge.

Syed, F. (2020) iOS Accessibility: Getting Started. Retrieved from www.raywenderlich.com: https://www.raywenderlich.com/6827616-ios-accessibility-getting-started

This article goes into detail about how to set up the XCode IDE for developing apps with voice output. This is a great place to learn how I can best develop for this accessibility feature, as it allows me to create an environment for testing. It also links to a sample project where I can see exactly how the code looks and compare that to my own code.

Judge, S. (2018). Means, Reasons and Opportunities for AAC. Retrieved from www.barsleyhospital.nhs.uk: https://www.barnsleyhospital.nhs.uk/assistive-technology/resource/means-reasons-opportunities-aac/

This is an article from my client, Barnsley Hospital. It talks about the Means, Reasons and Opportunity model and also has downloadable pdfs for the paper-based tool that I am turning into an app. This is a great resource to have and helps with me being able to have access to the original tool that makes the basis of my research.

Guidelines

Caldwell, B., Cooper, M., Reid, L. G. and Vanderheiden, G. (2008). Web content accessibility guidelines (WCAG) 2.0. WWW Consortium (W3C)

These guidelines define how to make Web content more accessible to people with disabilities and covers a wide range of disabilities, including visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities. This is perfect for finding the best practices for different areas of accessibility and what classes as accessible.

Patch, K., Spellman, J., Wahlbin, K. (2015) Mobile Accessibility: How WCAG 2.0 and Other W3C/WAI Guidelines Apply to Mobile. WWW Consortium (W3C)

These guidelines build on the previous guidelines and talk about how they apply to mobile development. This will be a great help when I am trying to take away principles from the 'Web content accessibility guidelines' and will allow me to convert over what I learn into a mobile development environment.

Conference material

Apple Inc. 2019. Accessibility in SwiftUI. In Proceedings of the Apple Worldwide Developers Conference 2019.

This conference talk is about the accessibility features of a new framework that they had just realised called 'SwiftUI'. It talks about the advantages of using the framework, how easy it is to make mobile

apps accessible with little extra effort, and why it is important to do so. It mainly talks about voice output, but other accessibility features are also mentioned. This will be great content and advice on how to add accessibility into my app as well as the best practices for doing so.

Apple Inc. 2020. App accessibility for Switch Control. In Proceedings of the Apple Worldwide Developers Conference 2020.

This second conference talk is about Apple's built in switch access in iOS called 'Switch Control'. It talks about what switch access is, how it is used and who it is used by. It gives great insights to a lot of information on how mobile phones are used by people with motor impairment. Along with the 'Accessibility in SwiftUI' talk, I have a good amount of information on how to develop an app with the accessibility features that are wanted by the client.