Source tracker

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1 Some general notes on my sources

Not all of my sources have been cross-referenced, although where possibly I've tried to demonstrate links between papers and their common subject matter. This doesn't really cause any problems though, as most of my sources are mathematical in nature. This means that really any source is either "wrong", or "right" about a theorem proposed by that source. This is pretty different from academic literature in more empirical fields, where cross-referencing is crucial.

Overwhelmingly, peer-reviewed maths papers older than a couple of years will be correct, and my most important sources are all decades old. This binary nature of mathematics also means that most theorems won't really be produced in more than one paper, except in some cases where an alternative proof is offered.

I would also argue that I have intrinsically been doing lots of research while writing my code. I have had to research what does and doesn't work, and write test plans to verify correct behaviour. I have also had to adapt what I've found in papers or online to work within the constraints of the programming language or my project. I have even written programs to simulate biological processes to verify the correct behaviour of my core programs.

2 Evaluation

Source	Source content/usage	Source evaluation
Wikipedia, The Free Encyclopedia [46, 45, 48, 49, 50, 51, 47]	I found several Wikipedia articles relating to my dissertation. I have decided to include them here as often I used them as a starting point for my research, eg to gain familiarity with the subject terminology and find convenient links to other Wikipedia articles, to get more of an idea of what's out there in the subject. The Wikipedia articles also provided a kind of baseline understanding of the material, which was then to be corroborated by my own research. They also provide their own links to other articles and sites which was useful in my research.	Obviously Wikipedia is not an academic source. In its defence, all of the information I found on there was then confirmed to be broadly correct by the actual literature of the subject (eg [18, 38]). However, on its, own, Wikipedia should not be considered a source, and these articles don't really underpin my dissertation. In the end, I decided still to cite them as they were a part of my research, as stated previously.
WHAT IS CRISPR-CAS9? [10]	This is a short "article" offering a brief introduction of the principles of CRISPR-CAS9. The best part is probably a diagram produced by MIT. It's not particularly informative aside from the most general, basic sense.	It's literally not from a scientific publication and has no academic merit. This is a bad source and does not prove or reinforce anything.
OligoCalc: an online oligonucleotide properties calculator [23]	This is the attribution for Oligo Calc, which I mention as a popular tool in bioinformatics to process olignocleotide data.	This is the requested citation from the authors of the tool.

PEP 257: Docstring conventions [16]	This is part of the Python style guide, used to back up some of my assertions about coding practices in my Definitions section.	Of course, it isn't remotely academic and verges on being an appeal to authority, but it is a well respected style guide with some explicit reasoning behing the decisions being laid out.
American Standard Code for Information Interchange [52]	This is the standard for ASCII, which I briefly mention while discussing encodings, specifically different ways to encode the letter 'A'.	This is **the** authoritative source for this purpose, as it is literally the standard that I am talking about.
Error detecting and error correcting codes [18]	Gives a construction of Hamming codes and lays the foundation for many of the concepts around channel-coding that I use in my dissertation.	This, is a paper by R. W. Hamming, who contributed much to modern error-correcting codes. It was published over 50 years ago in a respected paper by a respected author and has not only stood the test of time but also formed much of the basis of modern communication theory and can certainly be trusted.
A mathematical theory of communication [38]	This is also a useful paper for establishing the theory of communicative coding. It is useful for several definitions and general limits.	This paper, together with [18] are generally considered to be the seminal works on coding theory. This lays much of the groundwork for communication theory and gives a more general definition of the Hamming Code. Similarly to [18], this is a paper that can be trusted
Generalized dna barcode design based on hamming codes [9]	This article is very much relevant to what my project is about. It doesn't seem to be very clear though, and it uses a seemingly non-optimal form of parity. However it provides helpful insight into what actual researchers in the field are doing and have done with these ideas.	It is an article in a reputable, peer reviewed journal by researchers in the field so it can probably be trusted. The journal is slightly less well-known than some others I've made use of.
Introduction to coding theory [17]	This is more of a crash-course in coding theory, which was useful in developing a basic understanding but can be built on.	It's not an academic article so it hasn't been peer reviewed and wasn't written with the aim of academic rigour. However it was produced by a mathematician at a prestigious university so is likely to have some merit. It's also specifically aimed at the teaching of the subject rather than academic description which may be useful for my purposes.
Polynomial codes: an optimal design for high-dimensional coded matrix multiplication [53]	This source provides an explanation of a facet of the polynomial code. This code type didn't end up being used for my project but the source was useful in explaining why not.	This source is very technically detailed, which isn't necessarily bad, but this source feels very dense and can very well be difficult to understand for anyone not familiar with this specific subfield of coding theory. Of course it does have academic merit as it's a published, peer reviewed article.
Families of Hadamard z2z4q8-codes [12]	This is an article relating to a specific subset of Hadamard codes. I didn't end up using these codes but this source provided some broader context for what Hadamard codes are/can be used for.	This is again a highly technical source but is generally reputable aside from that.

Hadamard matrices and their applications [19]	This is a reasonably low-level paper about Hadamard codes. This was useful for my dissertation as I didn't use any overly complicated Hadamard constructions, and this was a useful source to cite, while also being trustworthy…	It's an academic paper from a trustworthy journal that has stood the test of time, and aside from that doesn't really make any outrageous claims, forming more of a useful and approachable summary of the subject matter.
The search for Hadamard matrices [15]	This paper gives a useful initial summary of the 'basic' construction of Hadamard matrices (of size $2^n \times 2^n$) which I use, corroborating [19]. It also provides a nice summary of other constructions, which I used to strengthen my case for not using them as they seemed unnecessary.	It's a trustworthy article, and again provides more of a summary. It's written in a relatively friendly manner.
Hadamard matrices and their designs: A coding-theoretic approach [2]	This paper gives a number of very mathematically involved constructions of Hadamard matrices. I didn't end up using any of these but it provided a useful further background around Hadamard constructions, and could be compared/contrasted with [15]	It's a trustworthy paper from a trustworthy journal and trustworthy authors.
Hadamard designs [39]	This paper is about Hadamard designs for alphabets of size n where $n \neq 2$. This is potentially very interesting with respect to my project as the DNA alphabet size n is 4. This source was used to provide citations in my general discussion about conversion between different alphabets.	It's a trustworthy paper although it is on an apparently quite obscure subject, making it quite a rare occurrence. This doesn't really reflect on the trustworthiness of the source due to the reasons described in section 1.
Lifted polynomials over F_{16} and their applications to dna codes [29]	This is a paper about a highly specific and even more advanced class of codes. It involved a lot of field theory, so for someone with an A-level knowledge of maths, will require a lot of further reading. However it does directly talk about applications of codes to DNA, which is useful to validate that this is a field with some merit.	It's a very reputable and technically accurate paper, but again is incredibly dense and required much more knowledge than I have, so I've not been able to effectively leverage it as a citation.
Codes, not ciphers [4]	This is an article providing description and intruction of coding theory, and contrasting that with cryptography. It is aimed at a 'school …level'. This means that it was useful to gain a quick overview of what coding theory is, but didn't really help with any major lifting.	It's from a very reputable paper, and is also easily accessible. This makes it a good, reliable resource for introduction to the topic.
Error correcting codes: Practical origins and mathematical implications [33]	This is a very short little paper, which provides a short history of the concept of codes. This makes it quite a special little paper, and quite nice to have read to gain a better contextual understanding of the field. However, again, there's not much to cite.	Again, from a highly trustworthy paper and an established mathematician. Occasionally it uses some pretty advanced mathematical analogies, but is certainly a very solid source.

Boole and the algebra of logic [24]	This is used as a small citation on Boolean algebra, which I needed when I was writing about my decision to use boolean inversion rather than additive inversion for my Hadamard construction. This isn't a very mathematically advanced source, but this is in line with my project as Boolean algebra was only a small part of a subset of my project, and the main focus was not on Boolean algebra.	This isn't really an article but a set of notes as it was published in 'Notes and Records of the Royal Society of London'. While this means it's not the epitome of academic rigour, it's still a useful and factual source on Boolean algebra from the Royal Society.
The degeneracy of the genetic code and Hadamard matrices. [31]	This is a great paper talking about how Hadamard matrices can be applied to and modelled against genetic code. The really cool thing is that this is a paper from a biomechanical perspective, rather than a mathematician's. This highlights the truly awesome thing about working at an intersection of fields. Aside from that, used for some backing up of the application of Hadamard matrices.	This paper is a little wonky in terms of academic merit - it's not published in any well known journal, which might make it seem somewhat questionable. However, it is mathematical in nature, and is mathematically sound. This paper would have nothing to gain from misleading anyone anywa.
Construction of multi-level Hadamard matrices with small alphabet [42]	This is a very interesting topic, as it potentially deals with the major limitation of Hadamard matrices - them having an alphabet of 2. Being able to construct a Hadamard matrix with different alphabet (ideally 4) would be incredibly useful. However, this paper doesn't quite go so far as to explicitly guide how that could be possible, so it's just another citation for theoretical extensions to this project.	It is a perfectly sound paper. Only quibble is that it's a little hard to gain access to.
Decoding the hamming code [13]	This is a tiny article offering a quick introduction to coding theory and Hamming codes. It contextualises the Hamming code in an interesting new way that I quite like and helped me really click with what they could be used for and what they were, so I used this source as an excellent other take on Hamming codes.	Again, despite not being very academic in and of itself it is from a very prestigious university and organisation, and can't really be faulted in any way.
Thoughts on inverse orthogonal matrices, simultaneous signsuccessions, and … [41]	This is the paper by Sylester that introduces his construction of the Walsh matrices. This is important to my project as this is the construction I mainly focus on/have implemented.	Again, academic paper with significant clout, and mathematically, it works, so it's good enough for me.
CRISPR/Cas, the Immune System of Bacteria and Archaea [20]	An article discussing the usage of CRIPR/Cas9 to various biological things. This helps to contextualise the potential applications of my outcome in the greater scheme of things.	Once again, a fine paper with not much to worry about.
Responding to CRISPER-/Cas9 [sic] [14]	This is short article discussing the ramifications/applications and ethics behind CRISPR. Again, used in the discussion of why CRISPR is interesting.	Note that the author misspelled "CRISPR" in the actual title - while this isn't a disqualifying blow, it's a bit iffy. However, some valid points are made.

RNA-directed gene editing specifically eradicates latent and prevents new HIV-1 infection [22]	Article that is also used to provide some more info about how the bigger picutre of gene editing can do good in the world.	Good academic scholarly article etc.
Perfect Parity Patterns: 11243 [25]	This is an article by the famous Donald Knuth involving parity, which I use as a citation for the definition of parity.	It was produced by an absolute icon and again is an academic, peer reviewed article so is certainly trustworthy.
A Fuzzy Hamming Distance [37]	An article about the Hamming distance (and fuzzy extensions of it), used to provide a credible source for the definition and utility of Hamming distance.	This is an article from a reputable journal, providing a definition of Hamming distance in line with various other sources such as [8].
DNA Sequencing and Melting Curve [3]	This is an article about the behaviour of DNA and similar molecules at high temperatures. This is useful to provide a citation regarding the melting of DNA at high temperatures, and how this can be influenced by the sequence of nucleotides.	This is a well-informed source using sound methods, and provides some pretty authoritative discussion. It doesn't discuss anything particularly controversial and has stood the test of time so is surely an adequate reference. It is corroborated by [32].
Single-molecule denaturation mapping of DNA in nanofluidic channels [34]	This article discusses other potential problems for certain types of DNA, namely denaturation. This is also used for a small part of my dissertation where I discuss potential limitations of my methods.	Again, it doesn't bring up anything particularly controversial and seems to be a good academic source.
DNA Melting Point Laboratory [32]	This is a more expert source on the topic of DNA melting points, which is used alongside [3] to provide credence to my assertions about all our DNA melting.	Similarly to [3], it is reputable and in mutual agreement with another source. Nothing to see here.
Cas9-Guide RNA Directed Genome Editing in Soybean [26]	This and the following sequence of other articles are about applications of genome editing. This one outlines their method for editing soy beans specifically.	It provides useful context for possible applications - although it is more of a proof of concept, this is all I need to briefly talk about potential applications.
Optimized gene editing technology for Drosophila melanogaster using germ line-specific Cas9 [35]	This article is about applying these techniques to flies, which is a little step above plants, and provides some more interesting discussion about living organisms	Again, the outline of the methodology is all I need and what I get. It helps that they're still all credible articles from credible journals.
A CRISPR/Cas9 Toolbox for Multiplexed Plant Genome Editing and Transcriptional Regulation [27]	This is somewhat interestingly about a general "toolbox" rather than a specific method and works to illustrate the general potential wider scope of CRISPR/Cas9.	Again credible journal source with sound methodologoy and recognition.
Targeted Mutagenesis, Precise Gene Editing, and Site-Specific Gene Insertion in Maize Using Cas9 and Guide RNA [40]	This is more of a topical application in the field of GM crops. It is also slightly different in that it is about mutagenesis, which all is interesting as further context.	Good article source with sound rapport

Efficient genome engineering in human pluripotent stem cells using Cas9 from Neisseria meningitidis [21]	This is more of a cutting-edge application of CRISPR (or, at least, feels like it) surrounded in more moral dilemma. It is about the application of CRISPR to human stem cells. However, controversial, it makes the list of applications all the more diverse.	This can be truste.
On an Application of Kronecker Product of Matrices to Statistical Designs [43]	This article introduces the Krönecker product, and then goes on to explore some statistical applications of it. I use the citation to define the Krönecker product in a short aside among some other matrix arithmetic.	It is literally just a definition of the Krönecker product, so it can't really be wrong. It also goes on to look at some interesting stuff in statistical designs.
Vector Orthogonal Polynomials [8]	This source mentions orthogonal vectors, which are used in the definition of Hadamard matrices by Sylvester in [41]. This can be used to back up that and any other references to orthogonality.	Again, this definition agrees with the mathematical community so there is no reason to question this source.
A Guided Tour to Approximate String Matching [28]	This source provides a definition of the fuzzier Levenshtein distance (as opposed to [18]). It is used to juxtapose with Hamming codes.	This source provides the correct definition of Levenshtein distance (in agreement with [44].
The String-to-String Correction Problem [44]	This again provides the Levenshtein distance, which is used to expand on the idea of string distance and go past the simple Hamming distance.	This source is in agreement with many other sources, such as [28].
An efficient class of SEC-DED-AUED codes [5]	This describes a set of Single Error Correcting, Double Error Detecting codes, which are a well known application of Hamming codes.	The construction of their class is valid, and more importantly it demonstrates the active research in this area.
A note on a result in the theory of code construction [7]	This is a short note on something related to Hadamard matrices. Not particularly useful, but an interesting addition to the other literature I have on Hadamard matrices.	It's not a full article but still provides sound mathematics and insight.
On the assignment of Walsh and quasi-orthogonal codes in a multicarrier DS-CDMA system with multiple classes of users [1]	This is an article about real-world applications of highly mutation-resistant codes like the Hadamard code, which is a good link to other applications, and also just generally about Hadamard codes.	While no longer entirely theoretical computer science, it remains a factual article.
Existence Theorems in the Geometry of Numbers [36]	While talking about some other interesting geometric theorems, this mentions a couple of sphere-packing theorems, which is why I'm using it as a short reference for the problem of sphere packing in arbitrary dimensions, and its relation to barcode design.	It's not inaccurate and a pretty good read
New High-Density Packings of Similarly Sized Binary Spheres [30]	This is talking specifically about the packing of discrete (binary) spheres, which is particularly pertinent to the application I have for sphere packing, making this a strong reference.	It would be unfair to say that this was in disagreement with eg [6] or [11].

Upper bounds for packings of spheres of several radii [11]	This provides some upper bounds, which works to illustrate the way our knowledge of sphere packing works - we know some things, like upper bounds, but we haven't got an optimal solution.	It's all fine - as it is a fairly recent source, the upper bounds are still relevant. This is one of the rare cases where the year a mathematical article was written actually matters.
Packing of spheres in spaces of constant curvature [6]	This is just one last source corroborating the others about sphere packing. It deals with the same broad topics (although this one goes a bit topological about curvature). It's used as just one more citation for sphere-packing as a topic.	This is from a reputable journal and has certainly stood the test of time and peer review.

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