

Gene Genealogy

Abstract-- This paper investigates how gene genealogy is applied to the real world and how computer science relates to this field. As of now gene genealogy is a growing field that can be used to help better research on family history as well as being able to identify remains by tying the DNA to a family with a missing person. Humans are made up of trillions of cells, which most contain a copy of DNA from each parent. DNA carries biological instructions which can tell the story of where one's ancestors came from. This field has grown exponentially over the past few years and testing has become more affordable and accessible as well. Throughout this research me and my mentor ran simulations to retrieve different outputs that would give us a hands-on experience of what gene genealogist could do.

Introduction- Throughout this paper many points regarding technology and gene genealogy will be made. The use of gene genealogy and how it is being applied to help families find missing relatives will be discussed and elaborated with the current information given. The background information of each detail will be provided, and examples will be given from real world situations. The point of this paper is to inform the public of all that is being done with the use of gene genealogy to help accelerate the process of finding missing humans. The goal throughout this project was for the team to learn more about gene genealogy and technology together and how scientist/researchers are coming together to develop ideas, as well as the goal for the audience was to be informed and to gain knowledge on these specific areas that the media may not spend so much time discussing.

Gene genealogy is the use of DNA testing in combination with traditional genealogical and historical records. Gene genealogy involves the use of genealogical DNA testing together with documentary evidence to infer the relationship between individuals. When a sample of one's DNA is analyzed for genealogy purposes, the aim of the test is to find other samples that share genetic similarities with the individual. These similarities can be used to ascertain likely familial relationships, along with establishing the geographic location from where this DNA originated. Gene genealogy first became available in the year 2000, primarily on a commercial aspect. Since then, other companies have created and have been established and many academic papers have been published. This field is consistently growing and adapting to expand and gain new information on ancestry. Gene ancestry testing aims to determine one's haplotype, this is alleles that one inherits from a parent. Common haplotypes from haplogroups that share common ancestors can be determined due to specific variants in the DNA.

Gene genealogy can be used for various reasons. One reason is how it is used in criminology and law enforcement, it has even helped solve cases in this field. DNA samples from crime scenes can be uploaded to genetic databases to identify relatives of unknown suspects, which narrows down the search. After this is done, traditional genealogy methods can be used to build family trees from the matches until the most likely suspect is identified. This has helped a tremendous amount in accelerating cases and solving them. All one would need is a DNA sample to help the crime, in some cases all it takes is for one distant relative of the suspect to upload their DNA to sites for a case to be solved, even after decades. Another common use of gene genealogy is how people who are interested in family history can go beyond what they can learn from relatives or even documentations. Examining one's DNA can give clues about where a person's ancestors

might have come from and what patterns of genetic variations are shared among people of a particular background. This could help bring closure to a person who has no idea where they are from or where their ancestors came from.

Throughout this project many simulations were ran and tested for a hands-on experience with various digging to gain more knowledge on how gene genealogy is used. The beginning of the research started off with different readings on variation, evolution, inferring phylogenies and gene genealogies. These readings helped expand the knowledge on this new subject and helped to see a new perspective on how these techniques are being used. During the first half of the research, the readings helped with understanding and to gain new ideas for the research. The second half of the research was more hands-on. Simulations were ran, as well as watching tutorials to better understand the assignment. Using the program “Indelible” to generate a non-ultra-metric birth death tree was a very new experience and was very insightful as well. Different instructions were given to follow and to see various outputs.

In conclusion, this research has given much insight on what gene genealogy is by using, finding, and summarizing data. Many new ideas have been brought to the attention and have been utilize during the research. Gene genealogy is being used more by specialist even in fields that can make a huge contribution. Today, many great minds are coming together in various fields to help bring knowledge and come up with more ways to implement gene genealogy. It will only get better as time goes on and the development will only become superior with the different fields bringing in data.

References

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