

Genealogical Implicit Affinity Network

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This paper presents a method for building a network that exploits affinities, or inherent similarities, shared among people, particularly family members.

What is the problem?

Although many people have large amounts of family history information at their disposal, they cannot always remember the attributes (traits, interests, etc.) of family members, and therefore are unable to discover and exploit possible affinities among them.

Why is it a problem?

It is a problem because we do not know our family members as well as we could, often forget about them, and miss opportunities to become closer to them. If we could better understand what we have in common with our relatives, we could draw strength from them, become more united, and build stronger family ties.

What is the solution?

Implicit affinity detection can be used to identify and quantify affinities among people. Affinities are discovered through similar attributes between one or more individual (see Table 1). Having more attributes increases the probability of sharing affinities.

<i>Name</i>	<i>Attributes</i>
Sarah	A B C D E
Bob	A D Q R S
Jim	X Y D
Mary	X Y Z
Susan	R P Q S
Brent	Q

Table 1: Attributes of Individuals

In this example attributes are abstracted as letters for simplicity

From the set of attributes, a matrix is constructed that shows the number of affinities shared among individuals (see Table 2).

	<i>Sarah</i>	<i>Bob</i>	<i>Jim</i>	<i>Mary</i>	<i>Susan</i>	<i>Brent</i>
<i>Sarah</i>	---	2	1	0	0	0
<i>Bob</i>	2	---	1	0	3	1
<i>Jim</i>	1	1	---	2	0	0
<i>Mary</i>	0	0	2	---	0	0
<i>Susan</i>	0	3	0	0	---	1
<i>Brent</i>	0	1	0	0	1	---

Table 2: Symmetric Affinity Matrix

The similarity matrix, in turn, can be represented as a weighted graph or network, where nodes are individuals and links are affinities (see Figure 1). The weight of each link is the strength of the affinity, i.e., the number of shared attributes.

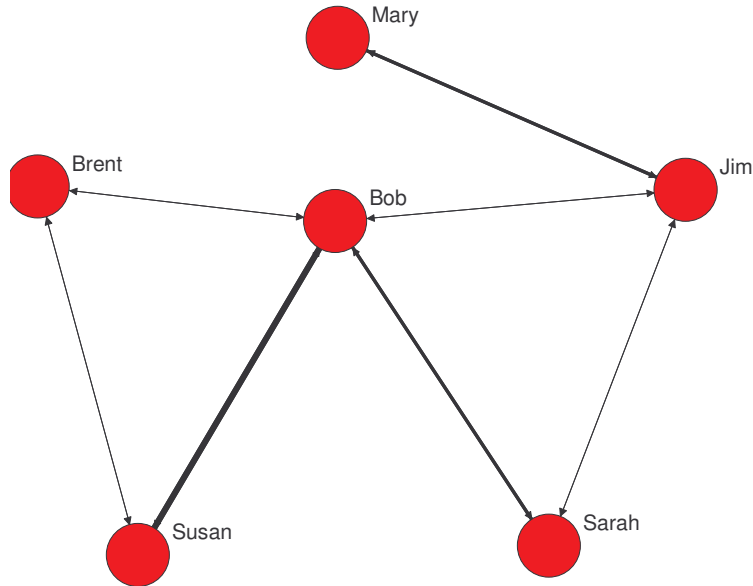


Figure 1: Affinity Network
Line thickness indicates the strength of the affinities

An affinity network can be used to identify easily how various individuals are connected through affinities. Alternatively, it can be viewed as a simple table of individuals where those sharing affinities are listed for each person (see Table 3).

Name	Individuals with Affinities (<i>ordered</i>)
Sarah	Bob, Jim
Bob	Susan, Sarah, Jim
Jim	Mary, Bob, Sarah
Mary	Jim
Susan	Bob, Brent
Brent	Susan

Table 3: Individuals and those with whom they share affinities
Ordered increasingly by affinity strength

The affinity network is unique and independent of family relationships; it is strictly based on affinities. In the context of family history, however, further insight can be obtained by overlaying the affinity network on top of a traditional pedigree chart (see Figure 2).

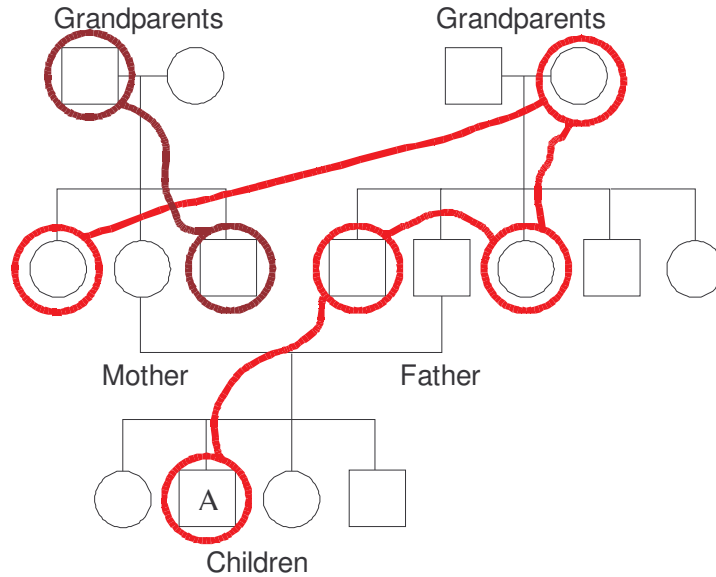


Figure 2: Pedigree Chart with Affinity Network Overlay

Why is it a solution?

Family history researchers routinely collect many different attributes that are useful and interesting for affinity networks. These attributes include (but are not limited to) hair color, height, weight, glasses, eye color, interests, employment, salary, hobbies, favorite food, favorite color, number of children, number of siblings, marriage age, talents, church positions, awards, pets, etc. These attributes can easily be stored in the “Notes” field of Personal Ancestral File (PAF), for example. These notes can then be mined to extract family affinity networks automatically.

The content of affinity networks can then be exploited to strengthen living families and in directing research. For example, in Figure 2, we see that Child A has strong affinities with his/her paternal uncle. We also discover that Child A’s maternal aunt has strong affinities with Child A’s maternal grandmother. This information may be used to create new family ties and strengthen – possibly even mend – existing ones. In the case of ancestors, it may direct further research on specific individuals. Knowing that we have some affinity with some ancestors encourages us to find out even more about them, bringing them “closer” to us and thus effectively “turning our hearts to them.”

Furthermore, since affinity networks can be built independent of family pedigrees, affinities can be discovered across spouses’ families, as well as among friends and co-workers.