

X and Y are associated, comprising: determining whether the first-degree anchor value Y appears as a second-degree anchor value in a set of second-degree anchor values in the profile of the first-degree anchor value X; and in response to determining that the first-degree anchor value Y appears as a second-degree anchor value in a set of second-degree anchor values in the profile of the first-degree anchor value X, using information stored in the profile of the first-degree anchor value X to determine how frequently the first-degree anchor Y was previously observed from a same digital interaction as the first-degree anchor value X; generating an association score indicative of how closely the plurality of first-degree anchors are associated, based at least in part on how closely the first-degree anchor values X and Y are associated.

In accordance with some embodiments, a computer-implemented method is provided for providing a profile of an anchor value, comprising acts of: detecting a plurality of digital interactions at different points in time; the plurality of digital interactions comprising web site and/or mobile device app interactions; for each digital interaction of the plurality of digital interactions: identifying from the digital interaction an anchor value X of an anchor type T; and updating a profile of the anchor value X, wherein: the profile of the anchor value X comprises a plurality of counters $C[i,j]$ ($i = 0, \dots, M-1; j = 0, \dots, N_i-1$); for each $i = 0, \dots, M-1$ and $j = 0, \dots, N_i-1$, the counter $C[i,j]$ indicates a number of times an event E is observed during a time interval $I_{i,j}$; and updating the profile of the anchor value X comprises: analyzing the digital interaction to determine if the event E is observed in connection with the digital interaction; and in response to determining that the event E is observed in connection with the digital interaction, incrementing the counter $C[i,0]$ for each $i = 0, \dots, M-1$; identifying the anchor value X from an on-going web site or mobile device app interaction; using the profile of the anchor value X to generate a score indicative of a level of risk associated with the on-going web site or mobile device app interaction; and if the score is above a selected threshold, alerting an operator of a web site or mobile device app via which the on-going web site or mobile device app interaction is conducted.

In accordance with some embodiments, a computer-implemented method is provided for analyzing a digital interaction, the method comprising acts of: identifying an anchor value X from the digital interaction; identifying, in a record of the digital interaction, a data structure associated with an anchor type T of the anchor value, wherein a plurality of anchor values of the anchor type T are divided into a plurality of buckets of anchor values; identifying a bucket B of

the plurality of buckets of anchor values, wherein the anchor value X falls into the bucket B;
operating on the data structure associated with the anchor type T to indicate that at least one
anchor value from the bucket B has been observed in connection with the digital interaction;
looking up the anchor value X in the data structure associated with the anchor type T to
determine if the anchor value X has been stored in the data structure associated with the anchor
type T; and in response to determining that the anchor value X has not been stored in the data

CLAIMS

What is claimed is:

1. A computer-implemented method for providing a profile of an anchor value, comprising acts of:

detecting a plurality of digital interactions at different points in time, the plurality of digital interactions comprising web site and/or mobile device app interactions;

for each digital interaction of the plurality of digital interactions:

identifying from the digital interaction an anchor value X of an anchor type T ; and

updating a profile of the anchor value X , wherein:

the profile of the anchor value X comprises a plurality of counters $C[i,j]$ ($i = 0, \dots, M-1; j = 0, \dots, N_i-1$);

for each $i = 0, \dots, M-1$ and $j = 0, \dots, N_i-1$, the counter $C[i,j]$ indicates a number of times an event E is observed during a time interval $I_{i,j}$; and

updating the profile of the anchor value X comprises:

analyzing the digital interaction to determine if the event E is observed in connection with the digital interaction; and

in response to determining that the event E is observed in connection with the digital interaction, incrementing the counter $C[i,0]$ for each $i = 0, \dots, M-1$;

identifying the anchor value X from an on-going web site or mobile device app interaction;

using the profile of the anchor value X to generate a score indicative of a level of risk associated with the on-going web site or mobile device app interaction; and

if the score is above a selected threshold, alerting an operator of a web site or mobile device app via which the on-going web site or mobile device app interaction is conducted.

2. The computer-implemented method of claim 1, wherein:

the time intervals $I_{0,j}$ ($j = 0, \dots, N_0-1$) are five-minute intervals and $N_0 = 12$;

the time intervals $I_{1,j}$ ($j = 0, \dots, N_1-1$) are one-hour intervals and $N_1 = 24$; and

the time intervals $I_{2,j}$ ($j = 0, \dots, N_2-1$) are one-day intervals and $N_2 = 14$.

3. The computer-implemented method of claim 1, wherein:
for each $i = 0, \dots, M-1$, the time intervals $I_{i,j}$ ($j = 0, \dots, N_i-1$) have a same length L_i .
4. The computer-implemented method of claim 3, wherein:
for each $i = 0, \dots, M-2$, $L_{i+1} = N_i * L_i$.
5. The computer-implemented method of claim 3, further comprises an act of:
for each $i = 0, \dots, M-1$, shifting the counters $C[i,j]$ ($j = 0, \dots, N_i-1$) periodically, wherein:
a period for shifting the counters $C[i,j]$ ($j = 0, \dots, N_i-1$) is L_i , and
shifting the counters $C[i,j]$ ($j = 0, \dots, N_i-1$) comprises:
for each $j = 0, \dots, N_i-2$, setting the counter $C[i,j+1]$ to a value of the counter $C[i,j]$; and
setting the counter $C[i,0]$ to 0.
6. The computer-implemented method of claim 1, wherein:
determining if the event E is observed in connection with the digital interaction comprises determining if both the anchor value X and an anchor value Y are observed from the digital interaction.
7. The computer-implemented method of claim 1, wherein:
a plurality of anchor values of a same anchor type are divided into a plurality of buckets of anchor values; and
determining if the event E is observed in connection with the digital interaction comprises determining if both the anchor value X and any anchor value from a bucket B of anchor values are observed from the digital interaction.
8. The computer-implemented method of claim 7, wherein:
the plurality of anchor values are divided into the plurality of buckets of anchor values at least in part by applying a hash-modding operation on the plurality of anchor values.
9. The computer-implemented method of claim 7, wherein:

the plurality of anchor values comprise a plurality of network addresses;
the plurality of buckets of anchor values comprise a plurality of buckets of network addresses; and
the plurality of network addresses are divided into the plurality of buckets of network addresses at least in part by applying a hash-modding operation on the plurality of network addresses.

10. A system comprising at least one processor and at least one computer-readable storage medium having stored thereon instructions which, when executed, program the at least one processor to perform the method recited in any of claims 1-9.

11. At least one computer-readable storage medium having stored thereon instructions which, when executed, program at least one processor to perform the method recited in any of claims 1-9.