

CLAIMS

1. A method performed by an analysis server (106) for monitoring user interaction patterns in client applications interfacing a server (102a-b) and rendered on client computing devices (110a-c), the method comprising the steps of:
 - receiving (S302), from agents (416) executing on the client computing devices (110a-c), analysis data (414) pertaining to sequences of user interactions (412a-c) with the client applications, and events of data traffic (416a-c) between the client applications (110a-c) and the server (102a-b) made in response to the user interactions (412a-c), each user interaction (412a-c) and event of data traffic (416a-c) being associated with a user identifier of a user executing the user interaction,
 - forming groups (S304) from the analysis data (414) by grouping each user interaction (412a-c) with any events of data traffic (416a-c) made in response to the user interaction (412a-c), labeling each group with a group identifier based on the user interaction (412a-c) and the any events of data traffic (416a-c) grouped in the group and associating each group with the user identifier being associated with the user interaction (412a-c)
 - for each user identifier in the analysis data:
 - identifying patterns (S306) among the formed groups associated with the user identifier, each pattern comprising a sequence of the formed groups including at least a start group and an end group, the pattern corresponding to a sequence of user interactions (412a-c) performed by a same user such that the start group corresponds to a first group comprising a first user interaction and the end group corresponds to a last group in the sequence of formed groups, and labeling each pattern with a pattern identifier based on the group identifiers of the sequence of the groups of the pattern, and
 - storing information (S306) pertaining to the identified patterns in a data storage means (108), the information comprising at least the pattern identifier of each pattern,

for each identified pattern identifier stored in the data storage means (108):

5 calculating a normal state (S308) of the identified pattern identifier among the formed groups by based on a difference between
 a number of unique user identifiers being associated with a group having the same group identifier as the start group of the pattern having the identified pattern identifier, and
 a number of unique user identifiers being associated with each group in a sequence of groups having the same group
 10 identifiers as the sequence of groups of the pattern having the identified pattern identifier,
 monitoring a change of the normal state of a pattern identifier over a time period, and
 generating an error condition in case the change of the normal state
 15 exceeds a threshold level.

2. The method according to claim 1, wherein each user identifier comprises at least one user type, wherein the method further comprising the steps of

20 for each identified pattern identifier stored in the data storage means (108),
 for each specific user type of the at least one user type,
 calculating a normal state (S308) of the identified pattern identifier for the specific user type among the formed groups
 25 based on a difference between
 a number of unique user identifier comprising the specific user type and being associated with a group having the same group identifier as the start group of the pattern having the identified pattern identifier, and
 30 a number of unique user identifiers comprising the specific user type and being associated with a sequence of groups having the same group identifiers as the

sequence of groups of the pattern having the identified pattern identifier.

3. The method according to any one of claims 1-2, further comprising the
5 step of

grouping the identified patterns (S312) stored in the data storage means (108) comprising more than two groups and having at least the same start group and end group, and for each grouped pattern:

10 labeling the grouped pattern with a pattern identifier based on the group identifiers of the sequence of the groups of the patterns grouped in the grouped pattern,

storing information (S312) pertaining to the grouped pattern in the data storage means (108), the information comprising at least the pattern identifier of the grouped pattern

15 calculating a normal state (S314) for the pattern identifier labeling the grouped pattern by adding the normal states of the patterns grouped in the grouped pattern.

4. The method according to any one of claims 1-3, wherein the method
20 further comprising the step of:

for each calculated normal state, storing (S310) the normal state for the corresponding pattern identifier and the corresponding pattern identifier in the data storage means (108).

25 5. The method according to claim 4 when being dependent on claim 3, wherein the step of storing the pattern identifier labeling the grouped pattern and the normal state is only performed if at least one of the normal states of the stored patterns grouped in the grouped pattern is lower than a threshold level.

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6. The method according to claim 2 or any one of claims 3-5 when being dependent on claim 2, wherein the method further comprising the steps of

monitoring the change of the normal state for a specific user type of a pattern identifier over a time period,

generating an error condition in case the change of the normal state exceeds a threshold level.

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7. The method according to any one of claims 5-6, wherein the length of the time period is based on a number of user interactions with the client applications during that time period.

10 8. The method according to any one of claims 5-6, wherein the length of the time period is based on a time-limited change on the server.

9. The method according to any of the claims 1-8, wherein each of the client applications are interfacing a plurality of servers.

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10. The method according to any of the claims 1-9, wherein the client application is a web browser rendering a web site, and wherein the group identifiers is based on a state of a web page on which the user interaction was performed.

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11. The method according to claim 10, wherein at least some of the group identifiers are based on a URL of a web page on which the user interaction was performed.

25 12. The method according to any of the claims 1-11, wherein the labeling each group with a group identifier comprises removing client application session specific data from the events of data traffic and the corresponding user interaction and then labeling each group with a group identifier based on the remaining parts of the events of data traffic and the corresponding user
30 interaction.

13. An analysis server (106) for monitoring user interaction patterns in client applications interfacing a server (102a-b) and rendered on client computing devices (110a-c), the analysis server (106) comprising:

- a receiving unit (202) adapted for receiving (S302), from agents (416)
 - 5 executing on the client computing devices (110a-c), analysis data (414) pertaining to sequences of user interactions (412a-c) with the client applications (110a-c), and events of data traffic (416a-c) between the client applications (110a-c) and the server (102a-b) made in response to the user interactions (412a-c), each user interaction (412a-c) and event of data traffic
 - 10 (416a-c) being associated with a user identifier of a user executing the user interaction,
 - an event grouping unit (204) adapted for forming groups (S304) from the analysis data (414) by grouping each user interaction (412a-c) with any events of data traffic (416a-c) made in response to the user interaction (412a-c), labeling each group with a group identifier based on the user interaction (412a-c) and the any events of data traffic (416a-c) grouped in the group and associating each group with the user identifier being associated with the user interaction (412a-c)
 - a pattern identifying unit (206) adapted for, for each user identifier in
 - 20 the analysis data, identifying patterns (S306) among the formed groups associated with the user identifier, each pattern comprising a sequence of the formed groups including at least a start group and an end group, the pattern corresponding to a sequence of user interactions (412a-c) performed by a same user such that the start group corresponds to a first group comprising a first user interaction and the end group corresponds to a last group in the sequence of formed groups, and labeling each pattern with a pattern identifier based on the group identifiers of the sequence of the groups of the pattern, and for storing information pertaining to the identified patterns in a data storage means (108), the information comprising at least the pattern identifier
 - 25 of each pattern,
 - a normal state calculation unit (208) adapted for, for each identified pattern identifier stored in the data storage means (108), calculating a normal

state (S308) of the identified pattern identifier among the formed groups by based on a difference between

- 5 a number of unique user identifiers being associated with a group having the same group identifier as the start group of the pattern having the identified pattern identifier, and
- a number of unique user identifiers being associated with each group in a sequence of groups having the same group identifiers as the sequence of groups of the pattern having the identified pattern identifier,
- 10 monitoring a change of the normal state of a pattern identifier over a time period, and
- generating an error condition in case the change of the normal state exceeds a threshold level.

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