IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Athanasios Katsamanis et al.	Art Unit :	4114
Serial No. :	16/441,521	Examiner :	Nicole A Kotulak
Filed :	June 14, 2019	Conf. No. :	7627
Title :	DEEP ACTIONABLE BEHAVIORAL PROFILING AND SHAPING		

MAIL STOP APPEAL BRIEF-PATENTS
Commissioner for Patents
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BRIEF ON APPEAL

(1) Real Party in Interest

Behavioral Signal Technologies, Inc.

(2) Related Appeals and Interferences

None.

(3) Status of Claims

Claims 1-14 are pending and on appeal.

(4) Status of Amendments

All amendments have been entered.

(5) Summary of Claimed Subject Matter

Claim 1 is directed to a method for aiding a multi-party interaction. As an example, such a multi-party interaction may be between an agent and a customer in a telephony-based customer service situation. (see, e.g., para. 30 of publication US2019/0385597). The parties have successive communication events, for example, successive turns in a dialog between parties (e.g., see claim 2), or as an alternative example, the method may be applied at the scale of successive separate telephone calls (i.e., dialogs) where each communication event is one call rather than one turn within a single conversation (see, e.g., claim 3). In any case, the method

includes acquiring signals corresponding to the successive events and processing them to generate a recommendation in an innovative manner.

There are two distinct steps or stages in how the recommendation is generated. In the first, the successive communication events are processed to form successive respective feature vectors. One or more of these feature vectors includes at least one behavioral profile indicator. Support for this is found at least at paragraphs 40-49 and Figure 4 (reproduced below) of the application as published. For example, each communication event corresponds to one of the w_i in the figure, and the feature vector corresponding to that event is Y_i, which contains behavioral profile values $y_{i,k}$, as discussed at paragraphs 38-40 and 45.

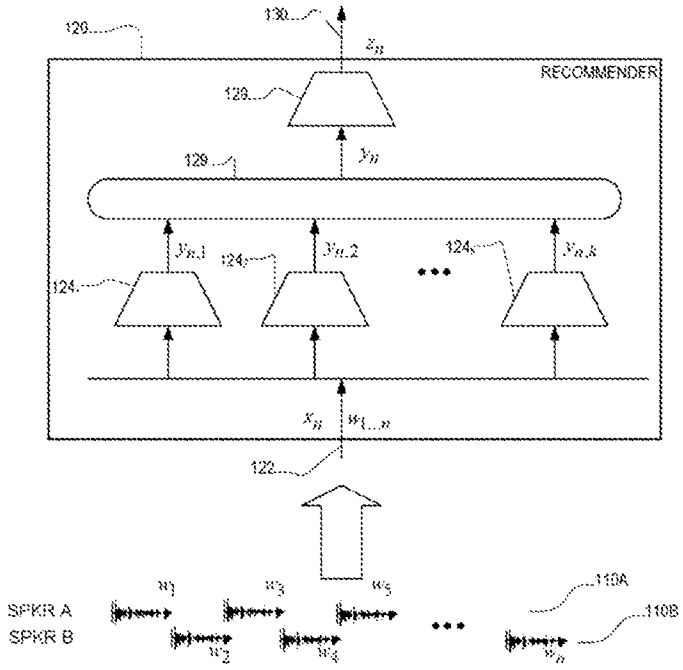

FIG. 4

In the second step or stage, it is the successive feature vectors that are processed to produce the recommendation, for example, as described at paragraphs 45-47. For example, the system's recommendation z_m after the mth event is based on the feature vectors of all the events up to that point, Y_1 through Y_m. The classifier 129 may be implemented as a recurrent neural network were the recommendation z_m is based on a the sequence of feature vectors by virtue of

it being recurrent. The first step or stage uses one or more neural networks distinct from a second neural network used in the second step or stage.

The recommendation is presented to at least one of the parties, for example, being presented to an agent in a customer-agent conversation.

(6) Grounds of Rejection to be Reviewed on Appeal

Claims 1-14 stand rejected being unpatentable over Raanani et al. (US 2018/0077286), in view of a Diriye et al. (US 2019/0327361).

(7) Argument

Claim 1

1) The Office has failed to address all limitations of the claims – "*respective feature vectors*"

The Applicant has previously pointed out that there is nothing to suggest that Raanani discloses that a "*sequence of feature vectors*" is produced from "*successive communication events between multiple parties*" as required by the claim. The Final Office Action alleges that producing the "*sequence of feature vectors*" is found in Raanani because:

> a machine learning algorithm such as a DNN … is used to generate classifiers for different time windows of conversations, i.e. processing…one or more of the successive communication events, where the classifiers include a set of features, i.e. one or more respective feature vectors[1]

That is, the Action contends that "classifiers include a set of feature vectors," which even if it was a technically correct statement (which the Applicant disputes) the Action makes no attempt to show that the successive communication events yield the recited sequence of feature

[1] Final Office action dated October 29, 2020, page 4, line 20 – page 5, line 2.

vectors produce "*respective feature vectors forming a sequence of feature vectors*". The Office seems to put no patentable weight on the word "*respective*" apparently relying on Raanani's processing of an entire conversation or initial window of such a conversation without forming the recited "*respective feature vectors*."

Notwithstanding the Applicant's remarks in response to the Final Office Action addressing this issue, the Advisory action repeats the conclusory statement:

> While the features have already been noted in Raanani [0036] by the Applicant, it is further shown in [0037] that each of the classifiers can include a set of the features that contribute to a specific outcome. Because each classifier can include a set of features, this can be read onto a feature vector.[2]

The Office therefore relies on forming of "*respective feature vectors*" as being disclosed by Raanani, but this has merely been alleged in a conclusory manner citing passages of the reference that have such sequences and without any specific allegation that there is such a "*respective*" association as required by the claim. Therefore, the Office has not addressed all the limitations of the claim and therefore the rejection must be reversed.

2) Raanani does not form the requisite "*respective feature vectors*"

The Applicant does not dispute that Raanani may describe a system for processing conversation between multiple participants to identify patterns in such conversations, and further to provide on-call guidance to a party in a conversation. With reference to FIG. 1, reproduced below, Raanani may determine on-call guidance 145 from real-time call data 150 using a real-time analysis component 130. However, Raanani's analysis component generates this guidance (stated by the Office to correspond to the recited recommendation) in a manner that is different than what is claimed.

[2] Advisory Action dated January 11, 2021, Continuation sheet, lines 5-8.

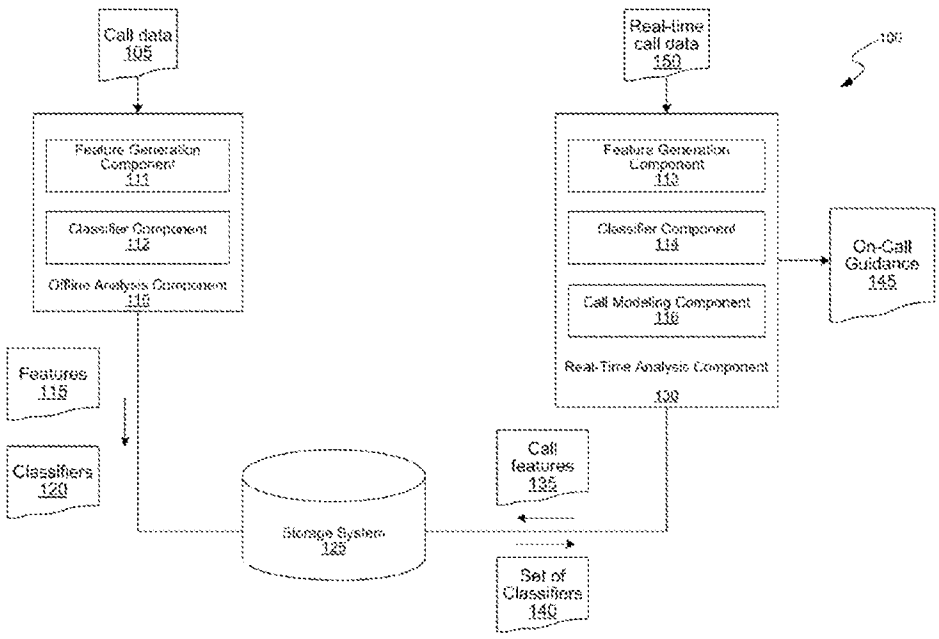

FIG. 1

In particular, the feature generation component 113 of the real-time analysis, which may be the same as the offline feature generation component 111, generates features such as "transcripts of audio recordings, vocabulary, semantic information of conversations, summarization of a call, …"[3] but there is nothing to suggest that these features are for respective events as required by the claim. Because no association of events (e.g., turns in a conversation) are described as associated with respective feature vectors, the rejection must be reversed.

3) The Office has failed to address all limitations of the claims – "*processing the sequence of feature vectors … to generate the recommendation*"

The Applicant has previously pointed out that the claim requires "*processing the sequence of feature vectors with a second neural network to generate the recommendation*" and that the reference does not disclose such a processing of a sequence as alleged by the Office. In response, the Advisory Action states:

[3] Raanani, par. 1 [0037]

> Raanani [0041:15-21][4] recites the call-modeling component performing analysis of a set of classifiers to provide on-call guidance.[5]

This statement does not address the lack of processing of a "*sequence*" of feature vectors. Rather, it merely addresses the possibility that the reference generates a recommendation (which for the sake of argument the Applicant does not here dispute) – the requirement that it is a sequence of feature vectors and that the feature vectors are produced from respective successive communication events appears to be ignored. This deficiency warrants reversal of the rejection.

4) The Office provides no factual basis for the contention that a "classifier" would be understood to include a "feature vector"

The Applicant has pointed out the technical fallacy that a classifier could in any way be equated with or include a feature vector:

> the classifiers themselves are in no way analogous to a sequence of feature vectors as would be understood by one of ordinary skill in the art having read the Specification at the time of filing. That is, the Broadest Reasonable Interpretation (BRI) of "feature vectors" is not so expansive to encompass the Raanani's classifiers.[6]

The Advisory action does not provide an explanation or any articulation of a BRI that would shed light on how a classifier can be viewed as *including* a feature vectors, stating

> In Raanani [0036-7], the classifier component is shown to use a machine learning algorithm to analyze features and generate a classifier, rather than the classifier itself being trained. Additionally, the classifiers are defined as including a set of features and values, and are not shown in Raanani as being neural networks, but rather, being generated by a neural network. Regarding the processing of the classifiers, the Examiner again refers to Raanani [0041:15-21], where the set of classifiers is analyzed by the call-modeling component to produce the on-call guidance, which is comparable to processing.[7]

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[4] The quoted passage reads: "a call-modeling component 116 generates an on-call guidance 145 that includes real-time probabilities of possible outcomes of the call as indicated by the set of classifiers 140."
[5] id, lines 12-13.
[6] Reply to Final Action, dated December 21, 2020, page 11, lines 21-24.
[7] Advisory Action, Continuation Sheet, lines 28-34.

The above-quoted statement "the classifiers **are defined as including** a set of features" has no factual basis in paragraphs [0036] or [0037] of the reference, or elsewhere in the reference. Indeed, the reference directly contradicts the above statement: "The real-time analysis component can then feed the features to the classifiers to generate probabilities of potential outcomes of the call" [0025]; "The classifier component 112 analyzes the features 115 using various techniques, e.g., machine learning algorithms such as SVM, DNN, to generate the classifiers 120." [0037]. Although the Office contends without factual basis that the classifiers relied upon "include" a set of feature vectors, it would be clear to one skilled in the art reading the reference that feature vectors are analyzed (e.g., a training set) to "generate" the classifiers and in real-time analysis are fed features to generate probabilities – in neither case is there any reasonable support for the classifiers being "defined as including a set of features." There is absolutely no factual basis that "generating" a classifier using feature vectors entails "including" those feature vectors in the classifier as the Office appears to allege is somehow self-evident. The Applicant contends misstatement of the teaching of the reference warrants reversal of the rejection.

Claim 2

Claim 2 requires that the "*communication events*" of claim 1 comprise "*conversational turns in a dialog.*" Taken together with the requirements of claim 1, the Office essentially argues that a succession of conversational terms is processed by Raanani to generate respective successive feature vectors. Even if Raanani were somehow construed to teach communication events to be processed as required by claim 1 (which the Applicant does not concede), there is absolutely no support in Raanani as alleged for there being any association of dialog turns with respective feature vectors. Because this feature is entirely absent from Raanani's description, the rejection of claim 2 must be reversed.

Claim 3

Claim 3 requires that the "*communication events*" of claim 1 comprise "*separate dialogs*." Raanani is relied upon for this feature. But Raanani does not disclose any generating of a recommendation with a sequence of separate dialogs as input.

The Office points to paragraph [0035] in support of the rejection. But that paragraph relates to the existence of historical data, which may include multiple conversations. But there is nothing to suggest that multiple conversations are used as input to generate a recommendation. Rather, that portion of Raanani's description relates of offline processing (i.e., "training"), and not to processing such historical data to generate a recommendation.

Furthermore, taken together with the requirements of claim 1, the Office is taking the position that Raanani teaches that successive dialogs produce respective successive feature vectors, and that such feature vectors are used to generate a recommendation. There is absolutely no factual basis for this contention in paragraph [0035] or elsewhere in the references relied upon in the rejection. Therefore, the rejection of claim 3 must be reversed.

Please apply any charges or credits to Deposit Account No. 50-4189, referencing Attorney Docket No. 30226-002001.

Respectfully submitted,

Date: 2021-06-17

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(8) Claims Appendix

1. (Previously Presented) A method for aiding a multi-party interaction comprising:

acquiring signals corresponding to successive communication events between multiple parties;

processing the signals to generate a recommendation by:

processing, with one or more neural networks, one or more of the successive communication events to produce one or more respective feature vectors forming a sequence of feature vectors, the one or more respective feature vectors including at least one behavioral profile indicator; and

processing the sequence of feature vectors with a second neural network to generate the recommendation for presenting to at least one of the parties in the interaction; and

presenting the recommendation to the at least one of the parties.

2. (Original) The method of claim 1 wherein the successive communication events comprise conversational turns in a dialog between the multiple parties.

3. (Original) The method of claim 1 wherein the successive communication events comprise separate dialogs between the multiple parties.

4. (Original) The method of claim 1 wherein the successive communication events comprise linguistic communication events comprising spoken or textual communication.

5. (Previously Presented) The method of claim 4 wherein processing the signals includes performing automated speech recognition of the signals.

6. (Previously Presented) The method of claim 4 wherein processing the signals includes semantic analysis of linguistic content of the signals.

7. (Original) The method of claim 1 wherein the signals corresponding to successive communication events represent non-verbal behavioral features.

8. (Previously Presented) The method of claim 7 wherein processing the signals includes performing a direct conversion of a speech signal without explicit recognition of words spoken.

9. (Previously Presented) The method of claim 1 wherein processing the signals comprises processing the signals using a first machine-learning component to generate the profile indicators.

10. (Previously Presented) The method of claim 9 wherein processing to generate a recommendation comprises processing the profile indicators using a second machine-learning component.

11. (Original) The method of claim 1 wherein the generating of the recommendation is ongoing during an interaction based on events in the interaction that have occurred.

12. (Original) The method of claim 1 wherein the recommendation includes an indicator related to success of a goal for the interaction.

13. (Previously Presented) A non-transitory machine-readable medium comprising instructions stored thereon, the instructions when executed by a data processing system cause said system to perform steps comprising:

acquiring signals corresponding to successive communication events between multiple parties;

processing the signals to generate a recommendation by:

processing, with one or more neural networks, one or more of the successive communication events to produce one or more respective feature vectors

forming a sequence of feature vectors, the one or more respective feature vectors including at least one behavioral profile indicator; and;

processing the sequence of feature vectors with a second neural network to generate a recommendation for presenting to at least one of the parties in the interaction; and

presenting the recommendation to the at least one of the parties

14. (Previously Presented) A system for aiding a multi-party interaction, the system comprising:

an input for acquiring signals corresponding to successive communication events between multiple parties;

a data processor configured to process the signals to generate recommendation by:

processing, with one or more neural networks, one or more of the successive communication events to produce one or more respective feature vectors forming a sequence of feature vectors, the one or more respective feature vectors including at least one behavioral profile indicator; and;

processing the sequence of feature vectors with a second neural network to generate the recommendation for presenting to at least one of the parties in the interaction; and

presenting the recommendation to the at least one of the parties; and

an output for presenting the recommendation to the at least one of the parties.