MODERN HIRE

FORMERLY MONTAGE HR Candidate Hiring Predictor

Modern Hire

THE CHALLENGE

A sophisticated applicant hiring company aims to improve the candidate screening process for their clients by screening applicants most likely to be hired. They wished to evaluate if acoustic analytics provided by Voicesense could accurately predict, early in the initial interview, which candidates were most likely to eventually be hired for a client's insurance claims adjustor positions.

The company sought an easy solution to screen candidates early in the process so that longer, in-depth, in-person, interviews could take place only with those applicants most likely to eventually be hired, providing an efficient, top of the funnel, screening process.

The objective of the pilot study was to evaluate if Voicesense predictive analytics could identify candidates most likely to be hired. The evaluation would retrospectively test audio samples from self-recorded answers to video interview questions.

THE SOLUTION

The hiring company provided 15,727 voice recordings of interviews from applicants to the Insurance Company. The company also provided data regarding which applicants were ultimately hired and which were not. Voicesense divided the applicants into training and test groups. The training

group was used to calibrate their behavior predictive analytics using the known the results. The test group would run analytics blind to the final result.
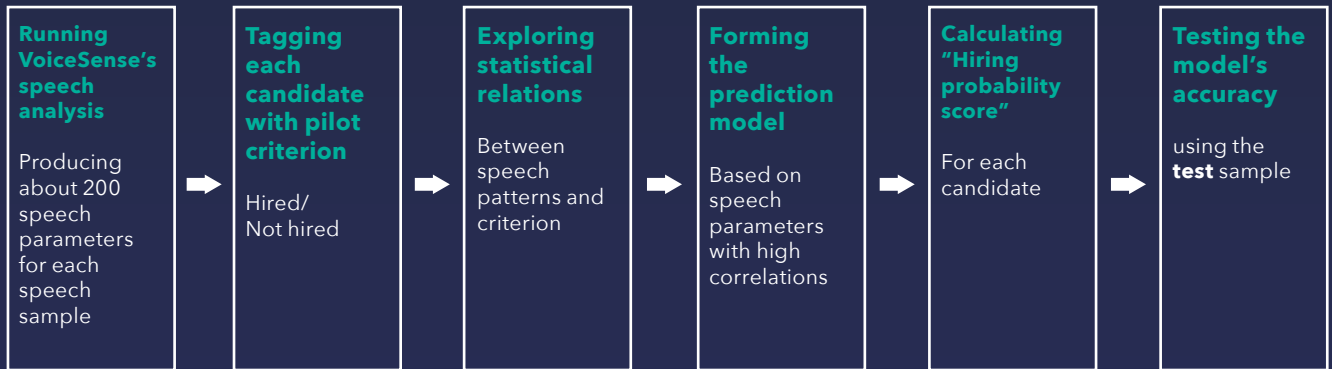
Additionally, specific indications were provided about the hiring process status and the reasons for which candidates were hired or not. Some of the reasons why candidates were not hired did not seem relevant as an indication for the candidate's disqualification (e.g. " Phone Disconnected", "Not Interested in Our Company"). Considering our purpose of identifying the candidates most likely to be hired for the job, we decided to remove all possible confounding variables. Each candidate was marked with another indication: Qualified/Disqualified/Not relevant/Not clear. "Not relevant" means that the reason for not hiring the candidate seems irrelevant for qualified/disqualified and "Not clear" means that we were not sure what is the meaning of the reason.

The analysis was performed only on the candidates with "Qualified" or "Disqualified". Detailed list of our indications

can be found in Appendix A. Eventually the dataset included 11,186 speech samples of 11,186 different candidates.

THE METHOD

Training and test samples The overall sample was divided into a training sample and a test sample, while verifying that both samples retained the same proportion of Hired/Not-hired candidates. The training sample included 7,271 subjects and the test sample 3,915 subjects. The prediction model was generated based on the training sample and the model accuracy was tested on the test sample.

Running VoiceSense's speech analysis	Tagging each candidate with pilot criterion	Exploring statistical relations	Forming the prediction model	Calculating "Hiring probability score"	Testing the model's accuracy
Producing about 200 speech parameters for each speech sample	Hired/ Not hired	Between speech patterns and criterion	Based on speech parameters with high correlations	For each candidate	using the **test** sample

THE RESULTS   **TRAINING SAMPLE**   **TEST SAMPLE**

Statistical Results

Pearson correlation was calculated between the reference criteria (Hired/ Not-Hired) and the predictive speech score in both training and test samples. Speech score was significantly correlated with the reference criteria (p <.0001) in both samples (see table 1). T-test was performed to examine the difference between the average speech scores of the two groups (Hired/Not-Hired) and was found strongly significant in both samples – training and test.

	Training Sample N=7,271	Test Sample N=3,915
Correlation	0.148	0.146
Corr. Significance	<.0001	<.0001
t-test significance	9.08E-37	6.20E-20

Table 1. Correlation and T-test results between speech score and Hired / Not hired criterion

Match Percentages

For each candidate, a speech score is calculated. According to the speech score, each candidate was categorized into a certain percentile ranging from 1-100 relatively to the whole sample.

The high percentiles represent candidates with high hiring probability, based on the vocal analysis. In the pilot we expected to find the highest percentages of candidates that were actually hired in the higher percentiles and the lowest hiring percentages in the lowest percentiles. About 15% of the overall candidates in the sample were actually hired; therefore we expect to see higher and lower hiring percentages as compared to an average of 15%.

The results are presented and can be used in two possible ways:

1. Percentages of hired candidates in each percentile group separately:

Training Sample

Score Percentile	98-100 %	95-98 %	70-95 %	50-70 %	20-50 %	0-20 %
N sample	150	219	1842	1425	2200	1435
% of sample	2%	3.0%	25.3%	19.6%	30.3%	19.7%
N Hired	46	64	399	235	251	134
% Hired	30.7%	29.2%	21.7%	16.5%	11.4%	9.3%

Test Sample

Score Percentile	98-100 %	95-98 %	70-95 %	50-70 %	20-50 %	0-20 %
N sample	72	115	958	811	1156	803
% of sample	2%	3%	24%	20.7%	29.5%	20.5%
N Hired	23	27	203	157	137	62
% Hired	31.9%	23.5%	21.2%	19.4%	11.9%	7.7%

2. Percentages of hired candidates in accumulated percentiles:

Training Sample

Score Percentile	Top 2%	Top 5%	Top 10%	Top 20%	Top 30%	Lower 70%	All sample
N sample	150	369	738	1478	2211	5060	7271
N Hired	46	110	182	351	509	620	1129
% Hired	30.7%	29.8%	24.7%	23.7%	23.0%	12.3%	15.5%

Test Sample

Score Percentile	Top 2%	Top 5%	Top 10%	Top 20%	Top 30%	Lower 70%	All sample
N sample	72	187	381	757	1145	2770	3915
N Hired	23	50	89	168	253	356	609
% Hired	31.9%	26.7%	23.4%	22.2%	22.1%	12.9%	15.6%

Conclusions and discussion

1. Highly significant correlations were found between Voicesense's predictive speech score and the reference criteria. Highly significant T-test differences were found between the speech scores of hired and non-hired candidates.
2. The speech score successfully predicted the hiring probability within the test sample. Candidates with high speech scores had a higher probability (4x) to be hired as compared to candidates with low speech score and higher probability (2x) as compared to the average probability in the overall sample.
3. The speech prediction offers grouping categorization of candidates with different hiring probabilities.
4. In the current pilot, we demonstrated a prediction model only for whether a candidate will be hired or not. Prediction results would even improve, once we will have data regarding how well the candidates actually perform in a certain position/job.
5. Practical implementations. The speech scores categorization offers useful practical implementations. For example, the results indicate that the hiring probability of 70% of the candidates with the lowest speech scores is only 12.9% (less than the average probability). Discarding these candidates can provide a quick candidate screening tool. The 30% of candidates with the top speech scores are also categorized internally and recruiters can focus on candidates with the highest hiring chances according to the number of required candidates.
6. Working profile. The study focused only on the external hiring probability as a single indicator, which can serve as screening tool. However, Voicesense's speech profiling offers much more. For each candidate, we can provide a detailed working evaluation report, including various personal scales such as temperament, ambition, working with others, systematic thinking, innovation, adjustment, dependability on so on, as well as various matching scores to different work types – management, sales, service, R&D and so on.
7. Operational flow. The operational flow we recommend is for each position, to use a job matching score for ranking and quick screening of the candidates. And then the customer recruiters could open an in-depth evaluation report for the remaining top candidates.
8. Overall, we view the pilot and the results as highly successful in proving the concept of using Voicesense speech analysis for ranking, screening and evaluating the job match of candidates to the required positions.