Case Study



AltexSoft & Bruxlab: Employing state-of-the-art machine learning and data science to diagnose and fight bruxism









Background

Bruxlab is a Dutch healthcare startup. Being a dentist and a serial entrepreneur, our client, Michiel Allessie, has been studying the teeth grinding problem (or so-called bruxism) and its impact on the patients' health.

Bruxism is known to have the prevalence rate of around 8–31% in the general population. It causes severe dental injuries, jaw disorders and headaches. Being a widespread and dangerous condition, it is hard to detect as it usually happens at night. Thus, our client saw a great business opportunity in creating a tool that would help dentists diagnose, monitor and eventually offer treatment for this disease.

	ROOFM			
Griņ	ding 240 cm			
evere	11:00 pm - 8:00 am	Curation: 08:00		
	AV Recorded S Remedies Warm bath	ounces t	·	
	Factors Catter Alco	ie, Smoking, Stression nol The grading score is the total rul The grading score is the total rul the grading score is the total rul	ntor d'indeside) e doptem duded e doptem	
		by the total of hours t	00	
			Contraction of the local day	



Business Challenges

The project concept was focused on an app running in the background during the night and capturing the sounds made by users while sleeping. Based on a sophisticated algorithm, the system would then be used to isolate grinding sounds and tabulate their score. The reports and recordings are then further forwarded to the patient's dentist and used for examination and treatment. To create the app, our team had to complete the following:

Develop an efficient sound recognition algorithm



Build a native iOS app to collect and process the data

Enable accurate reporting and data sharing within the system and with external users





Value Delivered

To deliver the end product in the requisite level of quality, in accordance with the client's expectations, our team has accomplished the following:

1. Accurate grinding sound recognition

Employing data analytics and machine learning techniques, AltexSoft team created For better users' convenience, we built the algorithm into a user-friendly mobile application. **DolGrind app** is distributed through App Store and has a minimal a complex algorithm, able to distinguish the teeth grinding from the rest of the noises. Our data scientists built a complex neural network and used more than 6,000 barrier to entry: anyone can start using the app instantly. Moreover, as 81% of mobile audio samples, both true and false, to solve the noise classification problem. For every users never part with their devices (according to the recent study), DolGrind can audio sample the team was able to extract a number of specific attributes, related monitor the bruxism symptoms naturally, with no inconvenience for the patients. to the grinding sound. Based on these characteristics, our algorithm has reached up to **80% accuracy** in sound recognition (with the accuracy growing as more samples from users are analyzed).

3. Easy doctor-patient interactions

After the recording is completed, the algorithm analyzes the audio file and forwards the segments with teeth grinding sound to the dentist for further investigation. All information about additional factors, such as smoking or stress, which may influence the grinding score, is sent to the doctor to ensure that the diagnosis is accurate. Visualized statistics are available for users within the app, and can be easily interpreted.

2. Convenient and accurate diagnostics at no cost







Recording Page

Bruxlab



Score Page Bruxlab



Algorithm Visualization in Test Environment Bruxlab





testgek.id10. segment #62--2 grindings (and 4 nongrindings), noise coefficient = 1666.667, (1378.5/0.8271)







Approach and Technical Info

The algorithm development took over 3 months, while the first version of the app was developed within 4 months. The project team included a Project Manager, Data Scientist, Software Engineer, QA Engineer and UI/UX Designer.

Native iOS app was developed using **Objective-C**, the algorithm was written in **Python** and then rewritten in Objective-C. The team employed state-of-art **data analytics** and **machine learning** technologies to implement the sound recognition algorithm.

The app is currently available in two variants. The basic DolGrind app is more selective, thus it is able to reduce the number of false negative sound samples. However, in this case there is a chance of missing a great deal of slighter grinding sounds, which can be as dangerous as the heavy ones.

Therefore, DolGrind Pro app, on the contrary, collects as many sounds as possible. The samples, both true and false, are then examined and manually verified by a dentist to ensure the most accurate grinding sound recognition.



Testimonial



"Good project management and very good machine learning team."

– Michiel Allessie, CEO / Founder, Bruxlab





AltexSoft US Sales HQ

701 Palomar Airport Road, Suite 300, Carlsbad, CA 92011 +1 (877) 777-90-97

AltexSoft Global HQ

32 Pushkinskaya Str., Kharkiv, Ukraine 61057 +38 (057) 714-1537 sales@altexsoft.com



Bruxlab





