



## Advanced mathematics behind intelligent playlist of the future

*Together with leading researchers from the highly-esteemed Austrian Research Institute for Artificial Intelligence (OFAI), Bang & Olufsen research engineers have developed a highly advanced digital algorithm which automatically creates playlists based on music similarity.*

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In 2003, Bang & Olufsen research engineers started a pre-study to find a relevant partner for a research project. More specifically, they were looking for a partner with whom to create an intelligent algorithm which could automatically capture the unique musical identity of a track and create a playlist of similar music. They soon discovered that OFAI - the Austrian Research Institute for Artificial Intelligence - would be the ideal partner for this project as OFAI works with AI methods that are as relevant to music classification as they are to bio-informatics or robotics.

OFAI is an independent research institution supported by the Austrian government, and one of Europe's leading non-profit contract research institutions in the field of Artificial Intelligence (AI). In the past, OFAI has cooperated with international and national organisations, universities and research institutes from 28 countries, but Bang & Olufsen was the first commercial company to carry out research studies in cooperation with OFAI.



Leading researcher from Bang & Olufsen, John Hammer explains about the co-operation with OFAI: "When developing this algorithm, we found some of the best music computing specialists in the world at the OFAI institute. We soon developed a strong working relationship with these people, who were very open and as dedicated as we were to achieving the highest possible standard."

A joint pre-study was soon followed by the initiation of an actual development project lead by Professor Gerhard Widmer, who specializes in machine learning, pattern recognition, Artificial Intelligence and music.

Professor Widmer explains: "The basic idea of the algorithm was to extract relevant musical attributes, and create models for computing these similarities. The models are then compared to one another, and filters are added to ensure that there will also be some variation in the music you hear when you use the algorithm to create playlists."

This analysis takes a vast variety of parameters like sound, dynamics, and rhythmic aspects into consideration when determining whether the music is similar or not. In this process, the algorithm uses a model that compresses the music so as to capture and compare the musical DNA of individual tracks. The track itself is not affected by this, and the quality remains the same. The object is purely to reduce the numeric values of the tracks enough to enable comparison of even very large amounts of data, such as an entire music collection.

"The algorithm considers a huge number of musical attributes to capture the unique musical identity of the track you have chosen. On the basis of this comprehensive analysis, it automatically compiles a playlist, playing you more of your chosen favourite music or 'More Of The Same', which is why we have chosen to call the algorithm MOTS. However, MOTS also introduces variation to make your musical journey as stimulating as possible," says John Hammer from Bang & Olufsen.

Already an award-winning concept with two patents pending, the MOTS algorithm was developed to let you enjoy your music and rediscover your music collection without the inconvenience of creating one playlist after the other. Integrated into the BeoSound 5 digital music player, MOTS takes you to the cutting edge of convenience, and on a musical journey which will please as well as surprise you.

**For more information please contact:**

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