



## From theory to practice: The development and application of a music classification and content personalization hybrid system.

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MeeMix developed a unique hybrid platform for personalized music playlists, recommendations and similarities. The development process comprised several extensive R&D stages which finally were integrated into one comprehensive unit.

First, our team of expert musicologists mapped the parameters that can potentially describe a musical piece. Some of the parameters were physically objective by definition (e.g., BPM), while others were more human-subjective (e.g., aggressiveness level). Next, our musicologists, together with our team of statisticians, chose the parameters that are most pertinent to defining musical taste. Within the parameters accepted we mapped possible values, and for categorical parameters we set matrices of the respective distances among their values. The process of creating these distances was done independently by several musicologists, with the results being aggregated and tested for high reliability. Having the parameters and their values defined, we developed a classification interface, and our musicologists manually classified more than 100,000 songs of various genres. During the process of classification, the parameters and their values were constantly monitored, allowing for integrity assurance and, where needed, redefinition of variables and values.

As a potential R&D tool for understanding human taste in music, we launched our website and community, Meemix.com, where members can create personalized music stations based on specific songs or artists. The website features dynamic interactivity with members, whereby mood can be set at any point, and members are encouraged to rate songs as a means of feedback and more precise taste acquisition. Using the algorithm we developed, and based on member traits, geographic location and response to songs played, we were able to map each member's **individual** preferences in terms of the importance of each musical parameter (e.g., *drumming style* more important than *bass dominance*), and the specific values preferred (e.g., among guitars, *slide electric guitar* more than *clean electric guitar*). This information allowed our algorithm to mature while adapting itself to member taste and changes in mood and preferences over time. In addition we were able to further synthesize the musical parameters that are related to human taste. Quantitative feedback from our users revealed that our personalization method increased the satisfaction of our members over time.

In a second developmental stage we began the process of automatic classification. We hypothesized that just as taste can be mapped into measurable physical parameters, so can extracted physical features be used to predict musical parameters, such as genre, aggressiveness and more. We developed an algorithm that integrates music signal processing, semantic web analysis, metadata extraction and statistical prediction methods, to create a hybrid system that yields better prediction results than standalone techniques.

Today, we employ our two strongest suites, automatic classification and personalized taste acquisition, to offer solutions for media classification and personalized music recommendation and playlist generation. Our services are provided via our comprehensive API, allowing for independent integration with clients in the web, mobile and TV markets. Our API will soon be available for developers and students to benefit from MeeMix technology.

To be presented are details of the parameter selection process, the algorithms themselves, and interesting empiric differences between populations. Using our system we can reveal trends among members, countries, etc. For example, we found that listeners in the Philippines, Austria, Japan and Sweden prefer softer music, while those in Venezuela, Russia, Turkey and Colombia favor more aggressive music. In addition members from Finland, Austria and Poland prefer more melancholic music, while members from Thailand, China and Peru prefer more cheerful music.