A new technique identifies versions of the same song

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A new technique identifies versions of the same song. Credit: SINC

A team of researchers from Pompeu Fabra University (UPF, Spain) has developed a system to identify common patterns in versions of songs, which will help to quantify the similarity of musical pieces. The technique, which appears in the *New Journal of Physics*, could be applied to analyse time series of data in other fields, such as economy, biology or astronomy.

"What we propose is a measure to quantify cross recurrences between two songs, that is, to be able to analyse repetitions of different musical patterns that have previously been identified from the tonal or harmonic content of the audio recording" Joan Serrà, co-author of the technique and researcher of the Musical Technology Group (MTG) of UPF in

Barcelona, explains to SINC.

Serrà and his team have developed this method, based on mathematical equations, which makes it possible to identify the concurrent presence of tonal events on two song tracks (taken from a CD or other device). The results can be visualised using Cross Recurrence Plots (CRPs).

For example, therefore, the researchers have taken the tonal profile from the song Day Tripper by the Beatles and have compared it with the version performed by the group Ocean Colour Scene, as well as with a different song, I've Got a Crush on You by Frank Sinatra. In the first case, the CRP shows oblique lines that reveal matches between the two versions, but in the second this pattern does not appear.

Serrà indicates that "The identification of versions of the same song (whether or not it is by the original artist, with the same instruments, with the same or different lyrics or language, in the studio or live) may be very interesting for scientific, commercial and intellectual property reasons, or simply for the interest of the end user".

The researcher points out that the cross recurrence plots and their quantification measures are "powerful tools for analysing and comparing time series of any type of data", which means they can be used in disciplines such as astrophysics, biology, engineering or the economy. For example, it would be possible with this technique to analyse over a period of time the correlations between the Ibex and the Dow Jones or with other stock exchange indexes.

The possible applications of this study in different fields have led to its publication in the New Journal of Physics, a journal of generalist and multidisciplinary physics.

More information: J. Serrà, X. Serra y R. G. Andrzejak. "Cross

recurrence quantification for cover song identification". *New Journal of Physics* 11: 093017, 2009.

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