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## Dig that Lick: Exploring Patterns in Jazz Solos

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**Abstract**— We give an overview of outcomes from the recently completed project "Dig that lick: Analysing large-scale data for melodic patterns in jazz performances", involving a multi-disciplinary and international team of researchers. On the technical side, the project built infrastructure and tools for extraction, discovery, search and visualisation of melodic patterns and associated metadata. These outcomes facilitate analysis on the musicological side of the use of melodic patterns in improvisation, to answer questions about the origins, evolution and transmission of such patterns. This in turn gives insight into the extent to which improvisers rely on patterns, the development of individual and shared styles, and the level of influence of individual musicians, based on the amount of reuse of their improvised material by later musicians.

### I. BACKGROUND

The recorded legacy of jazz spans a century and provides a vast corpus of data documenting its development. Recent advances in digital signal processing and data analysis technologies enable automatic recognition of musical structures and their linkage through metadata to historical and social context. Automatic data extraction and aggregation give unprecedented access to large collections, fostering new interdisciplinary research opportunities. The *Dig That Lick* (DTL) project developed novel technological and music-analytical methods to gain fresh insight into jazz history.

The importance of musical patterns to jazz is well established in the scholarly literature and popular discourse. Ethnographers analyse how musicians learn and use licks; music psychologists debate the role of licks in improvisation; and fan-generated YouTube videos illustrate the remarkable popularity of one seven-note pattern known simply as *The Lick*. Yet many open questions remain about the development and transmission of licks in individual careers and jazz history. We investigate the usage of patterns and licks in monophonic jazz solos using search algorithms on a large database of jazz solo transcriptions.

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### II. PROJECT OUTCOMES

The transcriptions are created automatically from commercial audio recordings using state-of-the-art melody extraction algorithms based on neural networks and advanced signal processing methods [1]. New evaluation metrics were developed to assess the suitability of extraction algorithms for tasks such as pattern matching [3]. An overview of the technologies employed in DTL [10], plus a detailed account of the pattern analysis [4] and three case studies [5,7,9] were presented. A study on jazz improvisation was also published [2]. Web-based search applications were developed, allowing the user to search for exact and inexact patterns in multiple melody databases, to specify constraints on the metadata and patterns, and to visualise and hear the retrieved results [6,8]. These interfaces are publicly available at the following web site: <https://dig-that-lick.hfm-weimar.de/>

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