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## **Mobile Way to Music Analysis: Learning Fundamentals Digitally**

### **1. INTRODUCTION**

Computer programs on music theory and music analysis have intensively developed in the early 21st century. In the last decade, wide invasion of new touchscreen devices created new opportunities for the study of music analysis in its basic components. The main achievement of touchscreen for musicians consists in the possibility to feel music kinesthetically while playing it directly on the screen. Modern tablets and smartphones while becoming widespread create new conditions in active learning of new music timbres, rhythmic models, and visualization of music tones and chords.

Nowadays a great variety of mobile applications — first of all on the iOS and Android platforms — have been still remaining methodologically unknown to most musicologists and music teachers. The core of this problem is not only in their computer competence but also in the initial orientation of many of such applications to the very basic music level or to simple music game with DJ accentuation. Meanwhile, there are several groups of mobile applications among them which may be greatly useful for professional study of music theory and analysis. Now we can detect several levels of such mobile applications: from the basic ones devoted to the elementary music training such as intervals and chords recognition, to the more advanced applications which deal with music perception of non-major and minor modes, ethnic timbres, and rhythms.

The main purpose of this paper is to demonstrate the most innovative features of such iTheory applications, to disclose the main tendencies in this process and to show how to use them in musicological aspects.

All the newest iTheory applications may be classified under two types.

### **2. MUSIC MATERIALS**

The first type considered in connection with academic purposes may be called ‘music materials’. There are four main application groups:

1. For common music study needs: quiz games — testing knowledge in music compositions — and play-sheets music applications for sight reading — like Music Sight Reading which contains MIDI melodies of different level of difficulty supplied with visualized meter models;
2. For more detailed acquisition of music fundamentals — sight reading, ear training, music dictation, and listening exercises in intervals, chords, scales. One can mention My Ear Trainer — with exercises on recognition of intervals, chords, and their progressions —, Scales Tutor, and Rhythm Teacher — with rhythmic models in one and two voices for copying. Among them, Chords seems to be the most advanced one; it may be used to recognize non-tertian chords with added tones;

3. For playing music kinesthetically by means of application-simulators of music instruments, in symphonic as well as in folk style. Contemporary applications on both the iOS and the Android systems have realistic sound of its timbre. So, they may be more interesting for professional musicians. Moreover, they have possibilities to play on such an instrument just while touching the screen keys or strings;
4. For applications aimed at study of ethnic traditional music — its modes and rhythmic models. Among them, there are several Chinese, Turkish and Indian applications which play the leading role in this process.

The common minus of above mentioned applications of the first and second type consists in their anti-musical mechanistic spirit: timbre of MIDI sound is far from realistic instrumental sound and the absence of music nuances in performing style of MIDI playback makes them unattractive for a professional musician’s ear.

The third and the fourth groups of applications may be considered as especially interesting for learning music theory. They may serve as a good starting point for 20th-century music study with complicated rhythmic models and chromatic modal scales, including non-tempered ones. Most of such applications have offline versions free to download — mainly Android based ones.

To disclose their potentialities in detail with some examples, we can mark out some types of applications which are effective for modal and rhythmic study.

#### **2.1 Applications Aimed at Modal Scales**

There are the two ways of demonstration of modal scales in the mobile applications:

1. Modal scales may be represented in soundless variants. As in Bouzouki Scales based on Greek folk music, modal scales with their tonics are shown in such a way. It is good for sight singing;
2. Visual informational blocks with modal scales may be combined with their MIDI playback — as in Music Scales. Scales from this application contain variants of usually used non-major-and-minor modes such as pentatonic — non-hemitonic and hemitonic —, mixed diatonic modes, symmetrical modes, etc.

Some examples of such a type of modal applications with good sounding virtual music instruments are:

- Korean instrument ‘Gugak’;
- Chinese instrument Guzheng from application named ‘Chinese Band’;
- ‘Blues scale’, for the study of blues mode like: C–E $\flat$ –F–G $\flat$ –G–B $\flat$ –C.

Some ethnic applications have micro-chromatic component in their sound content. Ethnic synthesizer

R-ORG (Turk-Arabic Keyboard) has the second-semi-low degree which is typical of music of Iran and Turkey.

Micro-chromatic intervals can be founded also in Santoor — with mugham modal scales — and Santoor Musical Instrument — with Indian modes.

Generally speaking, a large group of Indian applications aimed at raga study may be marked out in this modal context. Carnatic Raga contains more than 950 variants of Indian modes with different combinations. Swaras is the most convenient for academic musicological purposes. This application generates Carnatic (South Indian) music phrases for different ragas (scales). Each tune is randomly generated, based on existing compositions and traditional phrases in that raga. Unique phrases which closely follow the character of the raga are generated using a predictive pattern matching algorithm. As a result, musicians can choose the length of phrase, to repeat it by memory under the bourdon accompaniment in the tanpura timbre. It may be good material for music memory training and strong feeling of modal tonic.

## 2.2 Applications Aimed at Rhythmic Patterns

In the rhythmic field, there are also two variants of approaches among the applications.

The first of them includes mobile applications aiming at learning rhythmic models graphically demonstrating music beats. Shadjam Carnatic Kit and Turkish Music Rhythms are especially interesting in this respect. For instance, the main features and methodological effects of application based on Turkish music rhythmic patterns are the following:

- Efficiency for rhythmic training in coordination — by tapping with right and left hands together;
- Possibility to choose the rhythmic pattern;
- Possibility to study rhythmic pattern in different tempos;
- Visualization in the process of beating with small beats like eight notes;
- Synchronization of rhythmic patterns and their notation in student perception.

The second variant consists of simulators of percussion instruments — various drums from academic to ethnic models. Each of them may be used for learning rhythmic models by tapping on them on the screen.

## 3. FACILITATORS

The second type of applications is called ‘facilitators’. They may be divided into three groups:

1. Play-sheets music applications — facilitating sight reading —, like MuseScore which allows to listen to the sheet music, select parts of it to be displayed or to be played;
2. Speed changers of audio and video playback. The most important thing is that one can change music tempo without affecting the pitch. It gives possibilities to analyze and write down music fragments by ear as a music dictation — making music playback slower. Among them are Music Speed Changer, which allows to change the speed of audio files on the device in real time, or to change the pitch without changing the speed;
3. Fragment repeaters producing different types of repeating music fragments. As a rule, applications such as AB Repeat Player, AudiPo, Star Player, Smart Repeat can repeat user defined parts of audio or between A and B points. The most functional is Amazing Slow Downer Lite. It can repeat any

section of the music at full speed, slow it down or even speed it up by changing the speed between 25 % of original speed and 200 % (double speed) without changing the pitch.

All applications of this type may be of substantive use for analysing difficult music intonation and harmony as well as for notation decoding of the speech melodic line in verbal languages.

In that way, professional adaptation of iTheory mobile applications to academic study may improve skills in music listening, stimulate an interest for improvisation on virtual instruments — including exotic ones. Most part of such applications are free or low-cost, so they are widely affordable for student’s freestanding training. Professionally, ethnic musical applications may help to prepare musicians to study new components of music language doing it easier to learn than modern music — with its complicated chords, modal scales and rhythms. Psychologically, to the cultural part, such a style of music theory education can contribute to raising feeling of social tolerance through student’s experience in the sound world of other nationalities.

## KEYWORDS

Computer Music, Musical Cognition, Musical Pedagogy, Musical Perception.

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