Adapting Meter Tracking Models to Latin American Music

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Introduction

Goal: adapt state-of-the-art beat and downbeat tracking models based on temporal convolutional networks [1] to Latin American Music with small quantities of data

Target: two Latin American music traditions—Uruguayan *candombe* and Brazilian *samba*

Hypothesis: TCN model achieves good performance in *candombe* and in *samba* with little data due to high genre homogeneity

Proposed analysis:

- train models with increasing amounts of annotated data (< 1 min up to ~40 min)
- use three training strategies (FS, FT, and data augmentation)
- contrast model performance against off-the-shelf models trained in/developed for Western music
- contrast model performance against an effective baseline, a Bayesian model (BayesBeat) [2]

Datasets

Candombe dataset [3]:

- 35 rec. of *candombe* drumming (2.5 h)
- 4/4 meter with syncopation
- *chico*, *repique*, and *piano* drums
- irregular rhythm cycle division

Samba dataset (BRID) [4]:

- 93 short tracks, 30 s each (0.74 h)
- 2/4 meter
- ten different instrument classes: *tamborim*, *pandeiro*, *surdo*, *cuíca*, *agogô*, among others
- complex combination of timbres
- strong accent at second beat

Small Data

- Segment *Candombe* into 30-second snippets
- For both genres: select 93 excerpts, split in train / test (80% / 20%)
- **Train**: 10 s at the beginning of each excerpt (5 s train and 5 s validation)
- **Test**: full excerpts
- Use training subsets of increasing size:
  - 4, 9, 18, 37, 55, and 74 excerpts
  - Equivalently: 0.67, 1.5, 3, 6, 9, and 12 min
- For each subset, data is randomly selected ten times

Training Strategies

From scratch (FS):

- train model from scratch

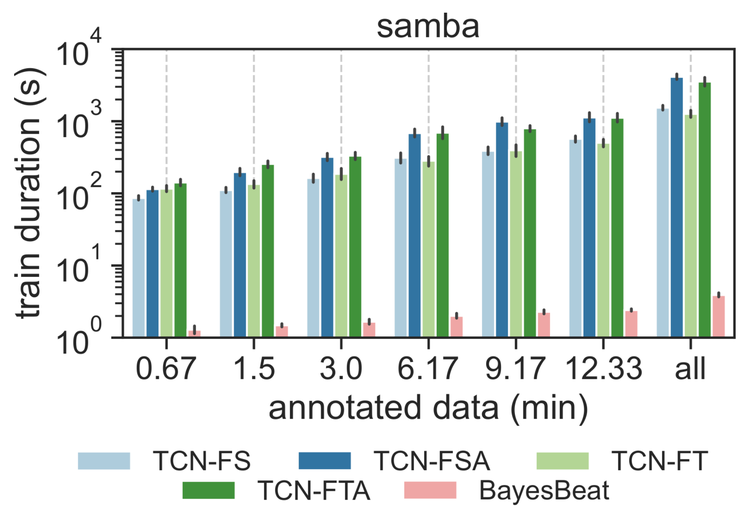
Fine-tuning (FT):

- transfer learning from Western music
- Ballroom, Beatles, GTZAN, and RWC

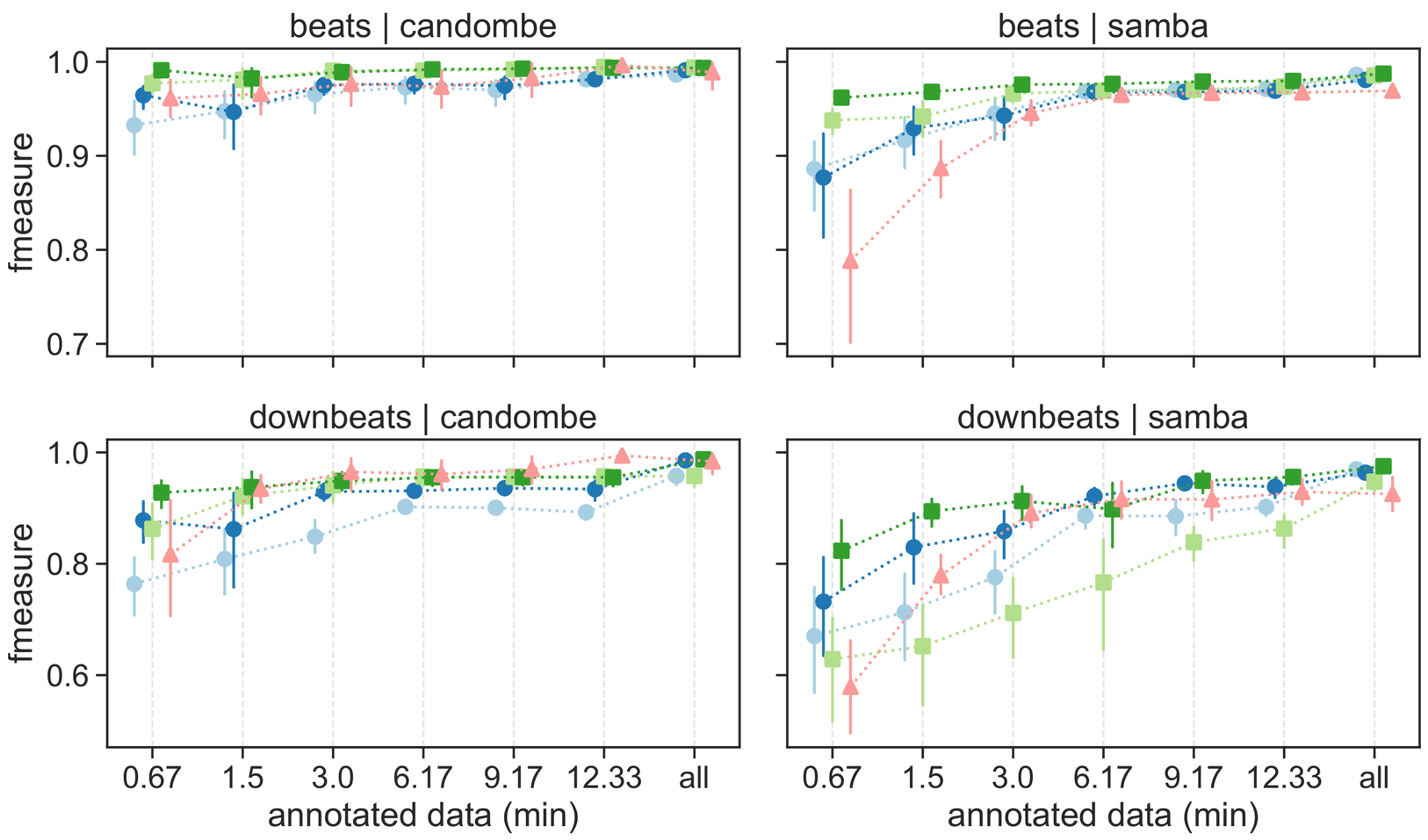
Data Augmentation (FSA/FTA):

- artificially increase training data
- input STFT with varying hop sizes
- repeat strategies FS and FT

Computational Cost



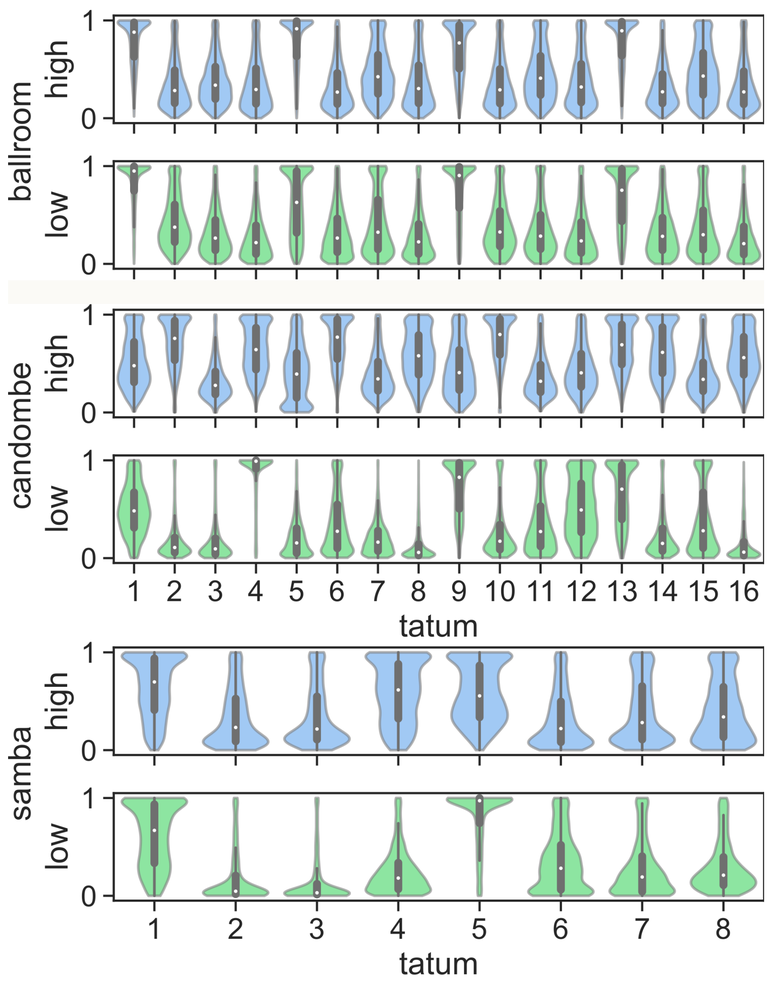
Model Performance



- Good performance with small amount of data
- More data required for *samba* (beat/downbeat)
- Best configuration: FTA; BayesBeat competitive, considering computational cost!

Homogeneity

FS procedure in Ballroom (4/4) yields worse performances in beat (10 to 34%) and downbeat (5 to 20%)



Conclusion

We adapted a meter tracking model using small quantities of data to work in particular Latin American music traditions, *samba* and *candombe*. This seems to be possible only under homogeneity conditions.

Future work: investigate rhythm complexity metrics that could serve to predict the amount of annotated data needed to adapt meter tracking models to particular music genres.

References

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