Introduction to **Audio Content Analysis**

Module 13: Mood Recognition

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introduction

overview

corresponding textbook section

chapter 13

- **lecture content**
  - introduction to emotion and mood
  - models for mood
  - linear regression

- **learning objectives**
  - describe Russel's arousal-valence plane
  - discuss commonalities and differences between mood recognition and genre classification
  - implement linear regression in Matlab

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mood recognition
introduction

- **objective**:identify mood/emotion of a song
- **terminology**:
  - *Music Mood Recognition* and *Music Emotion Recognition* usually used synonymously
- **processing steps** (similar to genre and similarity tasks)
  - extract features
  - classify (possibly regression)

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mood recognition
challenges

What is the difference between mood and emotion

mood recognition
challenges

What is the difference between mood and emotion

many definitions out there but general consensus on

- *emotion*:
  - temporary, evanescent
  - (directly) related to external stimuli
- *mood*:
  - longer term, stable
  - diffuse affect state

mood recognition
challenges

- **ground truth data**
  - *verbalization* of emotions/moods usually misleading
  - not easily *quantifiable*/categorizable
  - changing over time?

- **research questions**
  - are *basic emotions* (happiness, anger, fear, ...) representative for music perception?
  - should aesthetic emotions be distinguished from other emotions (guilt, shame, disgust, ...)?
  - *aroused vs. transported*/*evoked vs. conveyed* moods?

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mood recognition

models

- classification into **label clusters**[1]

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Rowdy	Amiable/Good Natured	Literate	Witty	Volatile
Rousing	Sweet	Wistful	Humorous	Fiery
Confident	Fun	Bittersweet	Whimsical	Visceral
Boisterous	Rollicking	Autumnal	Wry	Aggressive
Passionate	Cheerful	Brooding	Campy	Tense/Anxious
		Poignant	Quirky	Intense
			Silly	

- **mood model**, circumplex model

[1] X. Hu and J. S. Downie, "Exploring Mood Metadata: Relationships with Genre, Artist and Usage Metadata," in *Proceedings of the International Society for Music Information Retrieval Conference (ISMIR)*, Vienna, 2007.

mood recognition
models

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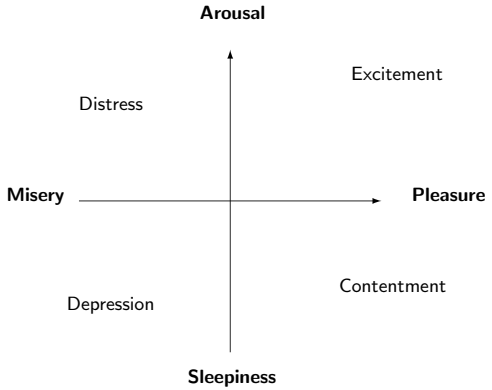
- **mood model**, circumplex model[1]



[1] J. A. Russel, "A Circumplex Model of Affect," *Journal of Personality and Social Psychology*, vol. 39, no. 6, pp. 1161–1178, 1980, ISSN:

mood recognition

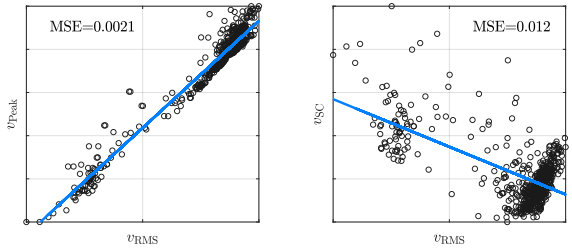
mood model: regression modeling

- **mapping**
  - (N-dimensional) observation (feature) to 2-dimensional coordinate (valence/arousal)
- **training**
  - find model to minimize error between data points and "prediction"

regression
regression

- linear regression: fit a linear function to a series of points (x_j, y_j)

$$y_n = m \cdot x_n + b$$



- other regression approaches: SVR, DNNs, etc.

matlab source: plotLinearRegression.m

mood recognition
range of results

- highly dependent on data
- **5 mood clusters**:
  40–60% classification rate
- **mood model**:
  0.1–0.4 absolute prediction error (unit circle)

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summary
lecture content

- **emotion and mood**
  - emotion: temporary, related to external stimuli
  - mood: long term, diffuse affective state
- **features**
  1. baseline features are identical to genre and similarity tasks
- **inference**
  1. often done as regression (as opposed to classification)