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Laskowski, K.: *Modeling norms of turn-taking in multi-party conversation*

Laskowski, K.; Schultz, T.: *Modeling Vocal Interaction for Segmentation in Meeting Recognition*
Motivation

Turn-taking is one of the most basic modes of cooperation in linguistic behavior.

A turn is a "speech [region] uninterrupted by pauses longer than 500 ms".
$K$ participants are at every point in time $t$ in the state

$S_t = \square$ (speaking) or $\Box$ (not speaking)

so every point in time is associated with a vector

$q_t = <S_{1t}, ... S_{Kt}>$

and a whole conversation of length $T$ is the matrix

$Q = [q_1, ... q_T]$
Motivation Model Project

Modeling state transitions

\[ P(q_{t+1}|q_t) = \]
\[ P(\{q_{t+1}\}, \{q_{t+1} \ast q_t\}|\{q_t\}) \times P(q_{t+1}|\{q_{t+1}\}, \{q_{t+1} \ast q_t\}, \{q_t\}) \]

with \( \{q\} \) being the number of participants in the state ■ and \( q \ast r \) yielding a vector containing ■ when the participant was active in both state vectors and □ otherwise.

Further

\[ P(q_{t+1}|\{q_{t+1}\}, \{q_{t+1} \ast q_t\}, \{q_t\}) = \frac{q_{t+1} * q_t}{q_t}!(\{q_t\} - \{q_{t+1} * q_t\})! \times \]
\[ \frac{(\{q_{t+1}\} - \{q_{t+1} * q_t\})!(K - \{q_{t+1}\} - \{q_t\} + \{q_{t+1} * q_t\})!}{(K - \{q_t\})!} \]
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Training the model

\[ P(\{q_{t+1}\} = n_j, \{q_{t+1} \ast q_t\} = o_{ij}\{q_t\} = n_i) = \]
\[
\frac{\sum_{r=1}^{R} \sum_{t=1}^{T} \delta(\{q_t^r\}, n_i)\delta(\{q_{t+1}^r\ast q_t^r\}, o_{ij})\delta(\{q_{t+1}^r\}, n_j)}{\sum_{r=1}^{R} \sum_{t=1}^{T} \delta(\{q_t^r\}, n_i)}
\]

with \( \delta(a, b) = 1 \) if \( a = b \) and 0 otherwise, and \( r \) indexing different data sets.
Project

- implement this model
- find an annotated corpus of conversations (AMI looks good)
- run the model for this corpus and compare the results with Laskowski’s
- experiment with different segmentation lengths