

Who will Attend This Event Together? Event Attendance Prediction via Deep LSTM Networks

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Event based Social network

Tabletop Warriors Gaming Association - Okinawa

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Tabletop Warriors Friday Open RPG Night

Tell a friend Share

Basic information

Friday, May 5, 2017
5:00 PM
Kadena AFB USO
Kadena AFB, Okinawa Japan, APO, AP (map)
<https://www.facebook.com/groups/208152255886597/>

We meet every Friday at the Kadena USO for our open RPG night. We play a rotating schedule of various RPG's of every genre. Come join a current game or bring a game of your own to try out or run. Open play begins anytime after 1700.

Check out our FB Message board for more gaming opportunity

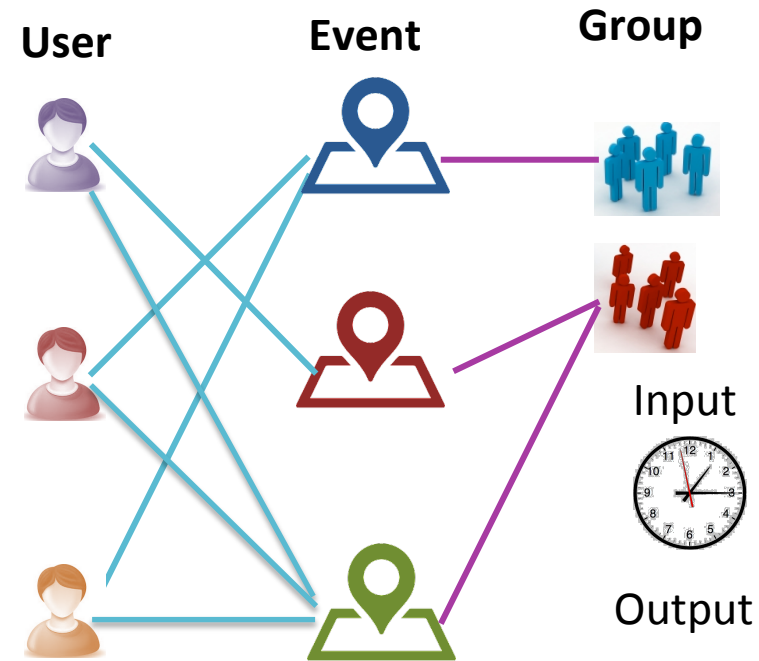
Want to go?

[Join and RSVP](#)

2 going

Robert Perry
Organizer, Event Host
The Tabletop Warriors Gaming Association (TTWGA) or just Tabletop Warriors (TTW) was began in... [more](#)

Left sidebar:
APO, AP
Founded Sep 22, 2015
About us...
Gamers 229
Upcoming Meetups 20
Past Meetups 169
Our calendar
Help support your Meetup
Chip In



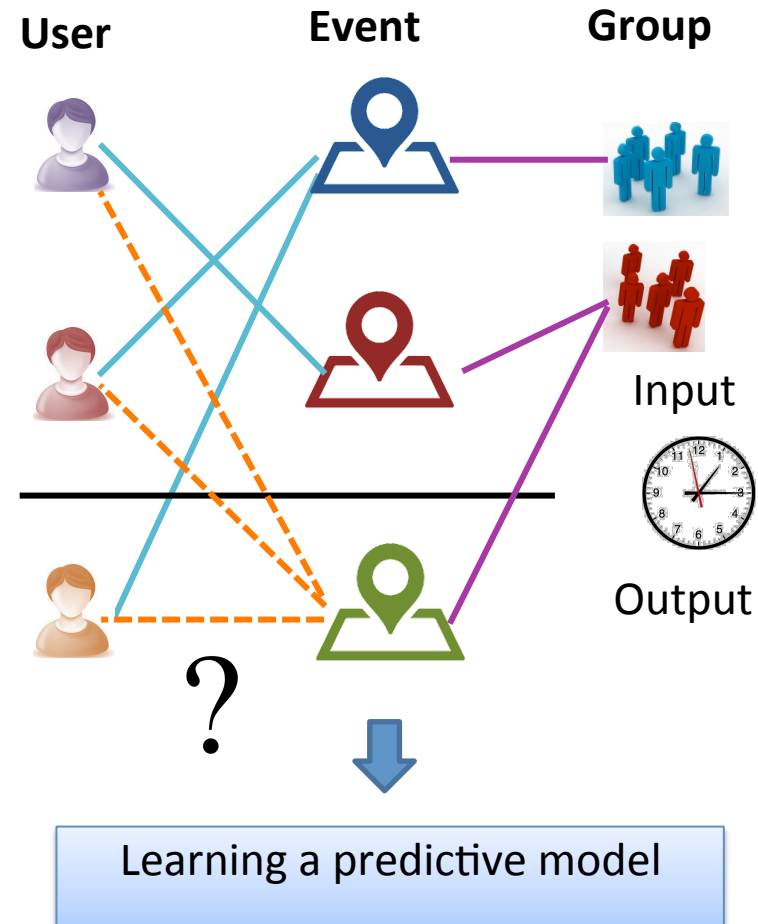
A snapshot of a event homepage in Meetup.com

Event Attendance Prediction

Given an incoming event, who will attend this event?

The screenshot shows a Meetup event page for 'Tabletop Warriors Friday Open RPG Night'. The event is scheduled for Friday, May 5, 2017, at Kadena AFB USO, Kadena AFB, Okinawa Japan. The page includes a 'Join us!' button, a 'Join and RSVP' button, and a list of '2 going' attendees, including Robert Perry, the organizer and event host. The page also features a sidebar with group information, including the group name 'APO, AP', founded date 'Sep 22, 2015', and a 'Chip In' button.

A snapshot of a event homepage in Meetup.com



Event Attendance Prediction

Previous work: **static** scenario— the assumption of users' static preference

Real-world: **dynamic** scenario — users' event preferences evolve over time

Event Attendance Prediction

Challenges:

1. Events in EBSNs are typically short-lived
2. The underlying factors may change over time
3. Users' event attendance behaviors are closely related to the contextual information of events
4. The connections between event attendance can be arbitrary since any pair of events could potentially be related for various reasons.

Challenges

Event cold start challenge:

Events in EBSNs are typically *short-lived* and are always in *future*.



It is challenging to explore the trace of events' historical attendance, in order to infer their future attendance.



Users' evolving preference challenge:

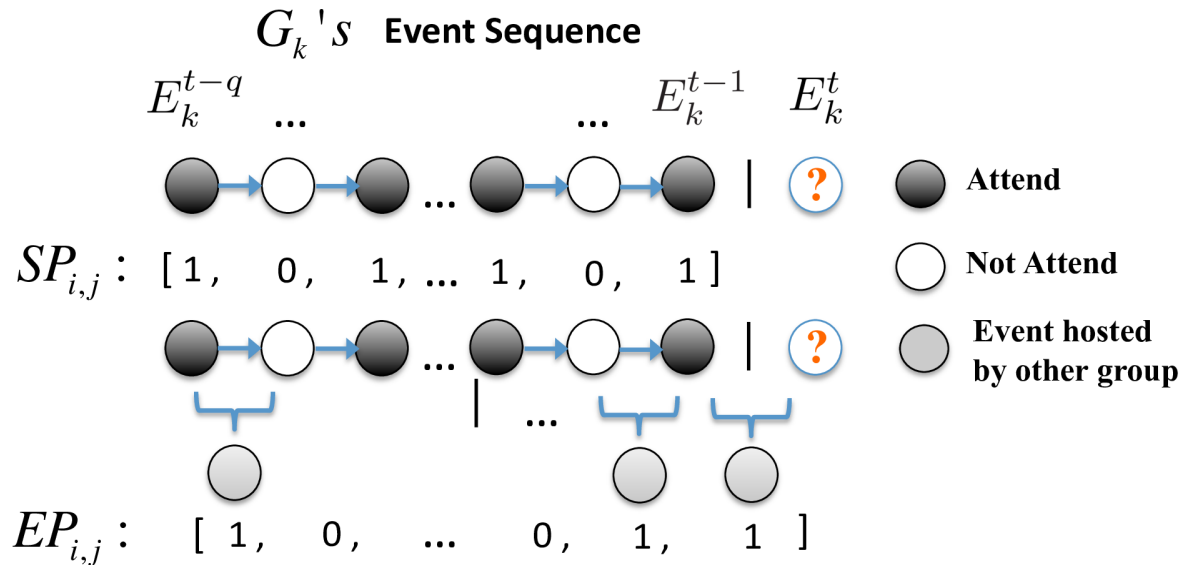
the factors influence an individual's attendance may change over time



It is difficult to model the dynamic nature of individuals' behavior.

Model

1. Sequential & Exclusive Preferences



2. Contextual Preferences

Spatial Dimension





Latitude
Longitude

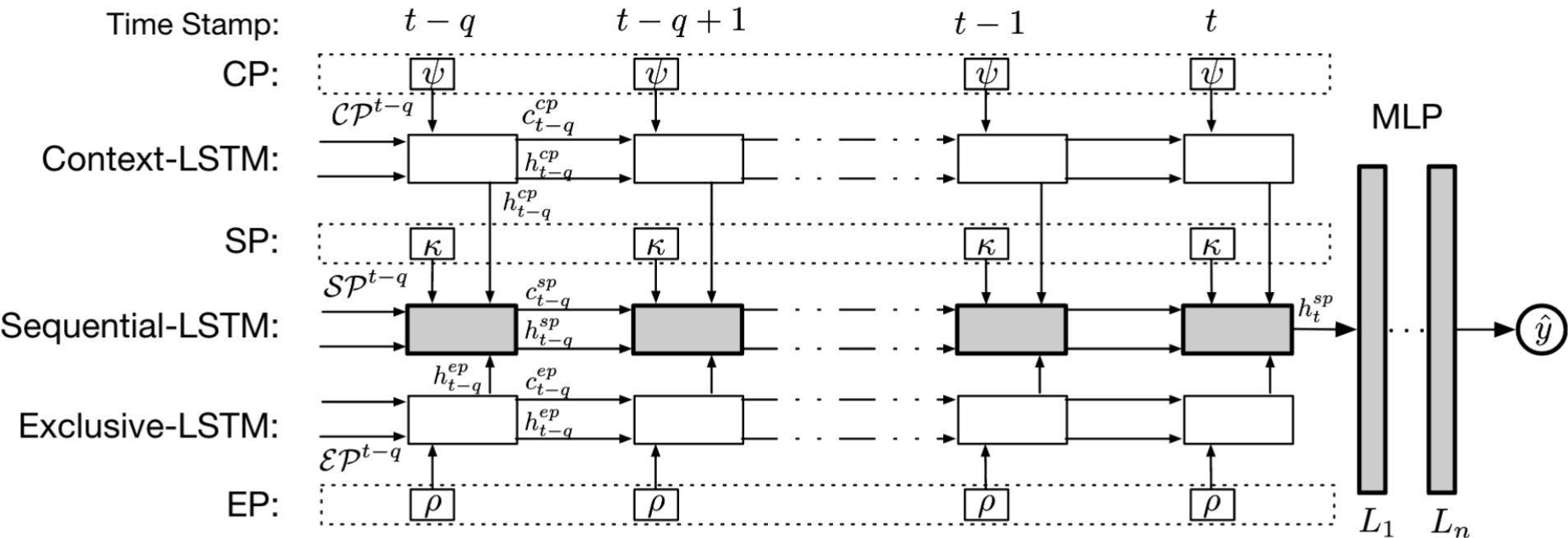
Temporal Dimension



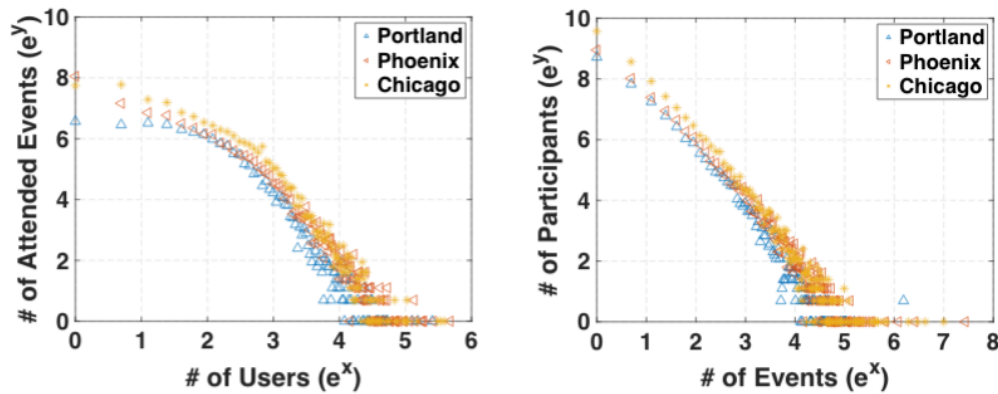


Timestamp
Information

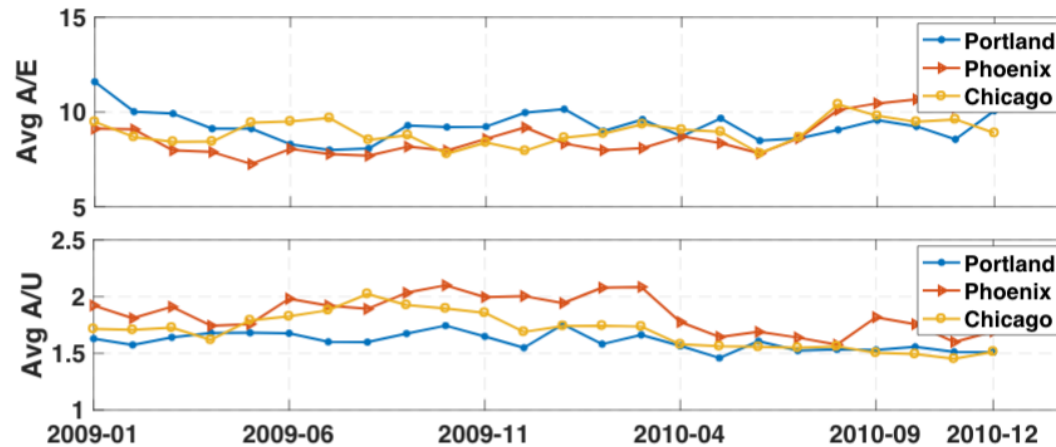
The DEAP Framework



Evaluation



(a) Distribution of Users' Attended Events (b) Distribution of Events' Participants



(c) Event Attendance Distributions over Time (Avg A/E: Average Number of Participants for each event; Avg A/U: Average Number of Attended Events for each user.)

Evaluation Results (Accuracy-1/5)

Table 4: Performance of all compared methods on Portland

Month	Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct	
Algorithm	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1
TF	0.222	0.255	0.211	0.249	0.212	0.256	0.194	0.227	0.206	0.250
NMF	0.178	0.236	0.177	0.192	0.204	0.259	0.193	0.171	0.115	0.184
DNN	0.207	0.269	0.163	0.242	0.093	0.169	0.162	0.273	0.106	0.200
LSTM	0.218	0.252	0.155	0.213	0.192	0.234	0.199	0.229	0.236	0.276
MCLRE	0.220	0.289	0.211	0.264	0.161	0.248	0.239	0.304	0.196	0.288
ST-RNN	0.313	0.337	0.323	0.356	0.306	0.346	0.290	0.320	0.284	0.327
DEAP	0.346	0.367	0.339	0.375	0.357	0.377	0.332	0.336	0.338	0.367



Table 5: Performance of all compared methods on Phoenix

Month	Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct	
Algorithm	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1
TF	0.218	0.387	0.210	0.329	0.226	0.373	0.187	0.272	0.187	0.274
NMF	0.176	0.218	0.151	0.159	0.190	0.236	0.165	0.199	0.116	0.192
DNN	0.088	0.190	0.163	0.273	0.212	0.342	0.114	0.227	0.127	0.226
LSTM	0.217	0.386	0.182	0.235	0.244	0.334	0.156	0.194	0.193	0.255
MCLRE	0.248	0.462	0.12	0.289	0.169	0.323	0.201	0.392	0.195	0.318
ST-RNN	0.295	0.484	0.300	0.425	0.329	0.457	0.299	0.448	0.252	0.354
DEAP	0.342	0.508	0.322	0.439	0.360	0.467	0.323	0.460	0.281	0.374

Evaluation Results (Accuracy-2/5)

Prediction Results on Dec with High-Level Region in NYC

Table 6: Performance of all compared methods on Chicago

Month	Jan-Feb		Mar-Apr		May-Jun		Jul-Aug		Sep-Oct	
Algorithm	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1
TF	0.246	0.335	0.224	0.276	0.212	0.287	0.223	0.278	0.227	0.312
NMF	0.201	0.293	0.135	0.200	0.204	0.259	0.193	0.171	0.206	0.240
DNN	0.235	0.344	0.199	0.289	0.140	0.249	0.125	0.212	0.209	0.226
LSTM	0.246	0.340	0.226	0.263	0.208	0.254	0.224	0.305	0.182	0.296
MCLRE	0.283	0.398	0.186	0.271	0.148	0.235	0.227	0.319	0.250	0.368
ST-RNN	0.332	0.437	0.321	0.366	0.331	0.410	0.329	0.380	0.353	0.440
DEAP	0.370	0.461	0.347	0.383	0.362	0.425	0.349	0.399	0.373	0.447

Conclusion

---- We propose to predict event attendance of each user in a dynamic scenario, where user preferences evolve over time. To address this task, we develop a DEAP framework which explicitly models evolving preferences of users from multi-dimensions.

---- We evaluate our new solution on three real-world Meetup datasets. The experimental results demonstrate the effectiveness of our model and show that DEAP outperforms other state-of-the-art baselines in terms of prediction accuracy.

Thank You!

The Interdisciplinary Center for Network Science &
Applications (iCeNSA)

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