WCAI Research Collaboration
An Unprecedented Opportunity to Work Directly with Electronic Arts
March 30, 2018
Introductions

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Questions?

To ask a question, click the chat button in the upper-right and type your question

• All questions will be answered live or via e-mail
Agenda

• Research Collaboration
• About Electronic Arts
• Available Research Projects
• Research Proposal & Application Process
• Q&A
A Few Operational Notes

This webinar is intended for researchers & scholars. It should not be published or presented without permission from WCAI.

Questions about our research programs or for press inquiries:

wcai-research@wharton.upenn.edu

To work with WCAI and Electronic Arts, research teams must submit a proposal to WCAI and EA for approval. More details throughout this presentation.
Research Collaboration

This new program gives scholars an unprecedented opportunity to work directly with data scientists at Electronic Arts

Benefits:

• It will put researchers in direct contact with professionals at EA

• It will allow researchers to benefit from the prior experience of the company’s data science team

• Researchers will work with EA to identify the ideal data assets to support the project

• Researchers will get to co-author publications with data scientists at EA

• WCAI will provide assistance with data management and logistics throughout the project
About Electronic Arts
• EA ranked as a Top Entertainment Company by Fortune’s list of the World’s Most Admired Companies
• Some of our famous games are FIFA, SIMS, Madden, Battlefield, Star Wars
• Our analytical and data science community at EA develop frameworks that deliver actionable insights to our studios and game teams
Our Studios

As well as...

- Respawn
- Criterion
- Motive Studios
- PopCap
- Capital Games
- Fire Monkeys
- Chillingo

And many more…
EA Contacts

Chen Teel - Project Lead
Senior Manager, Data Science

Jason Park - Project Lead
Data Scientist

Scott Allen
Director, Data Science

Zach Anderson
SVP and Chief Analytics Officer
Marketing Data Science Team

We are a team of 10 Data Scientists researching and developing models, tools & tech for all of our studios and leading the analysts across the company.

- **Modeling**
  - Multi-Touch Attribution
  - Recommendation Engine
  - Customer Lifetime Value
  - Social Media Sentiment
  - Natural Language Processing
  - Appstore Placement Impact
  - Forecasting
  - Customer Segmentation

- **Game**
  - Matchmaking
  - Economy Simulation
  - Player Progression
  - Clan Recommendation

- **Engineering**
  - Develop and Deploy Tech Stack
  - Database Architect
  - DevOps for Model Deployment
  - Develop R/Python Packages

- **AI**
  - In-Game Tour Guide Agent
  - Policy Optimization
  - Player Simulation
As Data Scientists we leverage many open source tools with active development and research. Some of the most frequently used tools are:

**Languages**
- Python
- Scala
- R

**Development**
- Jupyterhub
- Spark
- Shiny
- R Markdown
- R Studio

**Deployment**
- Docker
- Kubernetes
- Amazon Web Services
Available Research Projects
Available Research Projects

Electronic Arts is seeking researchers to collaborate on two projects:

• Multi-Touch Attribution in Marketing Campaigns
  - Project timeline: About 9 months
  - EA Project Lead: Chen Teel, Senior Manager, Data Science at EA

• Subscription Game Recommendation
  - Project timeline: About 9 months
  - EA Project Lead: Jason Park, Data Scientist at EA

Note: While these projects will involve regular interactions with EA, they are not intended to be consulting projects

• EA is looking for new and innovative methods that are actionable and implementable
Multi-Touch Attribution for Marketing Campaigns

As data scientists, we help marketing teams understand which online media drive more sales and help them decide how to spend their advertising budget.

- We have developed a multi-touch attribution model to quantify each media’s impact.
- We are interested in how ad exposures prior to and just after releasing a game affect conversions just after the release.
- We seek scalable, implementable approaches to this problem.
Correlation does not indicate causality remains a critical issue in attribution

• What is the best way to determine the causal effect of advertising from our historic data on media exposures and conversions?

• We seek solutions that will work within our data environment, where the data available for propensity matching is somewhat limited

• Are there suggestions on how to design a randomized experiment to determine marginal contributions of ads in a multi-media environment?
Attribution Challenge: Unrecognized Players

Our online media exposures are tracked by user cookies, but it is difficult to determine conversions for these cookies

- Many customers purchase games in a store or through their game console
  - These conversions are not linked to cookies that track the online ads
  - For these unrecognized players we can only track media impressions but not conversion

- Is there a good way to predict the unrecognized player’s conversion and estimate the impact of ads on those players?
Can we find something in the recognized players to learn about unrecognized players?
Attribution Challenge: Zero Impression Players

The media platforms we purchase ads from provide us with data on those cookies who have seen one of our ads at least once:

• We want to calculate the conversion lift relative to those who receive no impressions
• Our approach has been to estimate a model using the players who have seen at least one ad on at least one media
• Is there a more accurate way to get the baseline for converters who didn’t see any ads?
Attribution Challenge: Sequence of Media Exposures

We are very interested in how the timing and sequence of media exposures affects conversion

- We have not observed a dominant sequence of ads among those players that convert
- How can we incorporate sequence or path into our existing attribution model?
- If sequence matters, can we quantify the incremental impact of every ad on an individual level and optimize the timing of ad spending across media?
Attribution Challenge: External Factors

Besides player game history or game features, purchasing a game can also be influenced by news, social media trends and big events.

- If these external factors are not counted in predicting conversions, lift will be determined solely on media consumption.
- How can we count the magnitude of external news/events on conversions?

Game Launch
About the Data

The data includes information about users (cookies) who view ads (impressions) and click ads (engagements)

- For recognized players, the data includes information about conversions and EA user account data associated with the players
- To explore external factors (e.g. news, social media trends and big events), researchers will be encouraged to append and analyze 3rd party data
About the Data - Data Structure

EA Provided Data

- Unrecognized Players
  - Cookie Level
    - Cookies
    - Ad Impressions
    - Ad Engagements

- Recognized Players
  - User Level
    - EA User Account Data
    - Conversions

Researcher Appended Data

- External Data
  - Reddit, Metacritic, Google Trend, Facebook, etc.
Data Snapshot – Cookie Level Data (For Unrecognized Players)

<table>
<thead>
<tr>
<th>Cookie ID</th>
<th>Type of event</th>
<th>Ad Campaign</th>
</tr>
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</tbody>
</table>

Data Snapshot – User Level Data (For Recognized Players)

Ad Campaign

Type of event

Conversion date

Number of entitlements

Flag indicating purchase before the event
Questions?

To ask a question, click the chat button in the upper-right and type your question.

- All questions will be answered live or via e-mail.
Subscription Game Recommendation

As game companies move towards providing subscription services, it’s becoming more important to match players with games that they will like.

- We are looking for ways to achieve better recommendations using innovative methods.
- Researchers can propose any tools and methods, but since the work will be implemented, computational efficiency and scalability are important.
Recommendations: Better Game Attributes

We would like to explore feature engineering extra variables to describe the perception of games from public sources of data

• Are there novel ways to extract variables from publicly available datasets?
• Do perceptions of games change over time, before and after launch?
• Can our recommendation system react to changes in opinions over time?
Recommendation Challenge: New Versus Experienced Players

We are looking for solutions that are applicable to the entire player base

- Experienced players provide us with rich data, making it easier to predict their preferences
  - But data is usually “thin” for new players

- The solution may be multiple models
  - One for newcomers to the service
  - Another for veterans
About the Data

The data includes information about players and game entitlements (activations)

- To explore feature engineering extra variables (to describe the perception of games), researchers will be encouraged to append and analyze 3rd party data.

```
Game 56718 Launch
Game 56718 Activated
Game 17137 Launch
Game 17137 Activated
Player
```
About the Data - Data Structure

EA Provided Data

- Players

- Game Entitlements

Researcher Appended Data

- External Data

  - Wikipedia, Metacritic, Twitter, Subreddit, etc.
### Data Snapshot – Player & Game Entitlement Data

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</tbody>
</table>
Questions?

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Researcher Proposal & Application Process
Researchers will apply and submit a proposal online for one of the research projects. Proposals should be in PDF format, no more than 2,000 words, and include the following information:

- Title

- Author(s) name, title, affiliation and e-mail address: Please designate a corresponding author (Note: Teams are strongly encouraged, e.g. doctoral student(s) + faculty)

- Author bios: Please provide short bios of each team member covering prior work in the research area, experience collaborating closely with industry and any personal or professional interest in gaming

- Abstract
Introduction: Describe expected contribution(s), covering both the academic and practical aspects. Describe how you will approach the project and the key methods and ideas that you would like to bring to the table. Please keep it concise, and cite relevant work as necessary to explain your academic contribution. There is no need to include a lengthy literature review.

Detailed project proposal: Please include supporting detail that will help us assess the feasibility of your approach and its compatibility with existing EA approaches and data.

Data Needs: Bulleted list of data required or requested for analysis. While we can’t guarantee the inclusion of these items, we are happy to investigate the availability.

Languages/tools: What you propose to use and how it fits the project. (Note: There are no restrictions on software)
How to Apply

Submit your proposal here:
http://wcai.wharton.upenn.edu/research/collaborative-research-opportunity-electronic-arts/

• No later than Monday, April 16th, 2018, @ 9AM US Eastern

In addition to your proposal, we will be organizing some initial (virtual) pre-selection meetings with EA

• To discuss the project opportunity
• To determine if there is a good match in interests

Please contact us at wcai-research@wharton.upenn.edu, if you have any questions prior to submitting your proposal
Research Proposal Selection Process

One research team will be selected for each project

- **Within 6 weeks**, several research teams will be selected for initial (virtual) meetings with EA
- **Within 9 weeks**, 2 research teams will be selected & notified
- **Within 12 weeks**, projects will kick off
Proposals will be evaluated based on:

- **Novel approach to the project problem(s)**
- **Academic contribution and potential to significantly improve the research sponsor’s marketing practice**
- **Willingness to commit to a highly collaborative project, including regular interactions**
- **Willingness to share all code and findings with EA**
- **History of academic achievement**
Proposal Review Committee

Research teams will be selected jointly by a committee of academics and EA data scientists:

- **Eric Bradlow: Faculty Co-Director, WCAI**
- **Raghu Iyengar: Faculty Co-Director, WCAI**
- **Elea Feit: Fellow, WCAI**
- **Chen Teel: Senior Data Scientist, EA**
- **Jason Park: Data Scientist, EA**
- **Other external reviewers**
Questions?

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Other WCAI Opportunities for Researchers

If you registered for this webinar, you will receive regular announcements regarding upcoming Research Opportunities:

- **Research Projects**: [http://wcai.wharton.upenn.edu/for-researchers/research-opportunities/](http://wcai.wharton.upenn.edu/for-researchers/research-opportunities/)
- **Sign up for updates**: [http://wcai.wharton.upenn.edu/newsletter/](http://wcai.wharton.upenn.edu/newsletter/)
- **E-mail us**: wcai-research@wharton.upenn.edu