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Microsoft Research
Faculty Summit 2017
AI for Social Good: The Essential Role of Human Machine Partnership

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Co-Founder, Avata Intelligence
Mission Statement: Advancing AI research driven by…

Grand Challenges of Social Work

- Ensure healthy development for all youth
- Close the health gap
- Stop family violence
- Advance long and productive lives
- End homelessness
- Achieve equal opportunity and justice

...
Overview of CAIS Project Areas

AI Assistants for Low Resource Communities

- Social networks: Spread HIV information, influence maximization
- Real-world pilot tests: Big improvements
Overview of CAIS Project Areas

AI Assistants for Conservation

- Machine learning/planning: Predicting poaching spots, patrols
- Real-world: Uganda, South Asia...
Overview of CAIS Project Areas

AI Assistants for Public Safety and Security

- Game theory: security resource optimization
- **Real-world: US Coast Guard, US Federal Air Marshals Service...**
Lesson Learned: Essential Nature of Human-Machine Partnership

- Building decision aids/assistants: Humans focus on their expertise
- Partnership at individual and organization level:
  - Low Resource Communities
  - Wildlife Conservation
  - Public Safety and Security
AI Assistant for HIV Prevention: Using Social Networks to Spread HIV Information
Challenge: Adaptive selection in Uncertain Network

$K = 5$

1st time step
HAVE YOU HEARD?

TODAY'S AGENDA

1. INTRODUCTION
2. SEXUAL HEALTH + CONDOMS
3. HIV/HCV/STI 101
   LUNCH!
4. COMMUNICATION
5. OUTREACH
6. LEADERSHIP + SELF CARE
   WRAP-UP

WITH
ROBIN  ERIC  JAIH  AMANDA
Challenge: Adaptive selection in Uncertain Network

K = 5
2\textsuperscript{nd} time step
Challenge 3: Adaptive selection

K = 5
3rd time step

NO LONGER A SINGLE SHOT
DECISION PROBLEM
Creating an Adaptive Policy: “POMDP” [2015]

- Homeless shelters – sequentially select nodes under uncertainty
  - Policy driven by observations about edges

```
Actual social Network in the real world
  ▶ Action
  |    ▶ Choose youth for intervention
  |      ▶ Observation: Which edges exist?

POMDP POLICY
Generation

Adaptive Policy
```
Real Networks – Simulation Results [2016-2017]
Pilot Tests
with 170 Homeless Youth [2017]

Recruited youths:

<table>
<thead>
<tr>
<th>HEALER</th>
<th>HEALER++</th>
<th>DEGREE CENTRALITY</th>
</tr>
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<tbody>
<tr>
<td>62</td>
<td>56</td>
<td>55</td>
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Preliminary network —> HEALER
Bring 4 youth for training, get edge data —> HEALER
Bring 4 youth for training, get edge data —> HEALER
Bring 4 youth for training
Results: Pilot Studies

Percent of non-Peer Leaders

- Informed
- Not Informed

Informed Non-Peer Leaders Who Started Testing for HIV

- Testing
- Non-Testing
Analysis: Pilot Studies

% of edges between peer leaders

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| Coverage of communities in 1st stage

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Next Steps: AI Assistant for HIV Prevention

- 900 youth study begun at three locations in Los Angeles
  - 300 enrolled in HEALER/HEALER++
  - 300 enrolled in no condition
  - 300 in Degree centrality

“Picking youth as peer leaders was changing their self esteem and the sense of confidence....”

Eric Rice
Overview of CAIS Project Areas

AI Assistants for Low Resource Communities

- Substance abuse, suicide prevention…
- Modeling gang violence, matching homeless and homes…
AI Assistant for Protecting Wildlife in Uganda
AI Assistant for Poacher behavior prediction

Data from Queen Elizabeth National Park, Uganda

Number of poaching attacks over 12 years: ~1000
Poacher Attack Prediction

Poacher Behavior Prediction

Results from 2015

![Map of Queen Elizabeth National Park](image)

- **L&L**
- Uniform Random
- SVM
- CAPTURE
- Decision Tree
- Our Best Model
Real-world Deployment: (1 month)
Real-world Deployment: Results

- Two 9 sq KM patrol areas: Predicted hot spots with infrequent patrols
- Poached Animals: Poached elephant
- Snaring: 1 elephant snare roll
- Snaring: 10 Antelope snares

<table>
<thead>
<tr>
<th>Historical Base Hit Rate</th>
<th>Our Hit Rate</th>
</tr>
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<tbody>
<tr>
<td>Average: 0.73</td>
<td>3</td>
</tr>
</tbody>
</table>
Real-world Deployment: Field Test 2 (6 months)

- Catch Per Unit Effort (CPUE)
  - Unit Effort = km walked
  - Our high CPUE: 0.11
  - Our low CPUE: 0.01

Historical CPUE: 0.04
Field Test Side Effects:
Queen Elizabeth National Park

- Rangers followed poachers’ trail; ambushed camp
  - Arrested one (of 7) poachers
  - Confiscated 10 wire snares, cooking pot, hippo meat, timber harvesting tools.

- Pursuit of poachers
- Signs of road building, fires, illegal fishing
Building AI Assistants: Human Machine Partnership in “AI for Social Good”

- Humans focus on their expertise, AI assistants on theirs:
  - E.g., social workers interact with youth, AI assistants on selecting youth

- Lessons in Building Assistants:
  - Right task division for humans vs machines
  - Right adjustable autonomy; human may be wrongly biased
  - Explanation of output

- Implementation requires organization level partnership:
  - Immersion opens up our eyes to complexity; builds up trust over time
  - Need a champion on the inside
AI for Social Good
THANK YOU
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