AI for Social Good:
Key Techniques, Applications, and Results

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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

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Overview of CAIS Project Areas

AI for Assisting Low Resource Communities

- Social networks: Spread HIV information, influence maximization
- Real-world pilot tests: Big improvements

Overview of CAIS Project Areas

AI for Earth

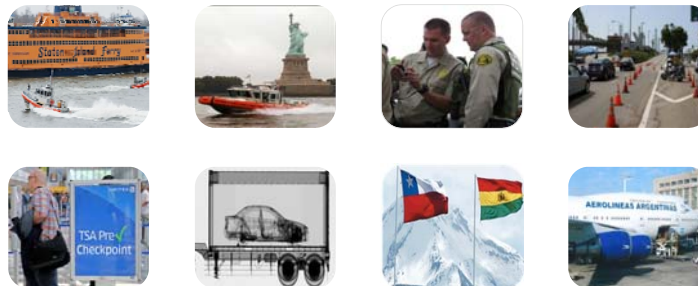- Machine learning/planning: Predicting poaching spots, patrols
- Real-world: Uganda, South Asia…

Overview of CAIS Project Areas

AI for Public Safety and Security

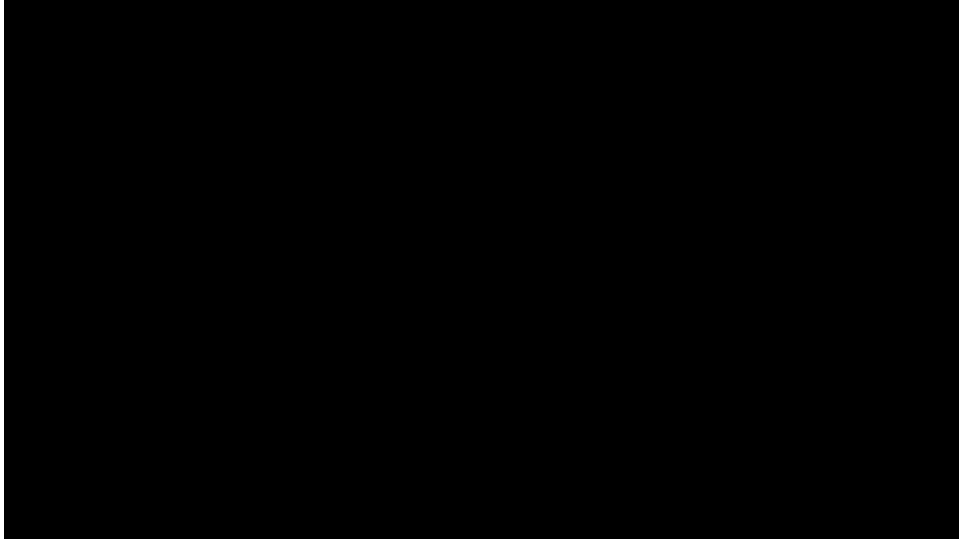- Game theory: security resource optimization
- Real-world: US Coast Guard, US Federal Air Marshals Service…

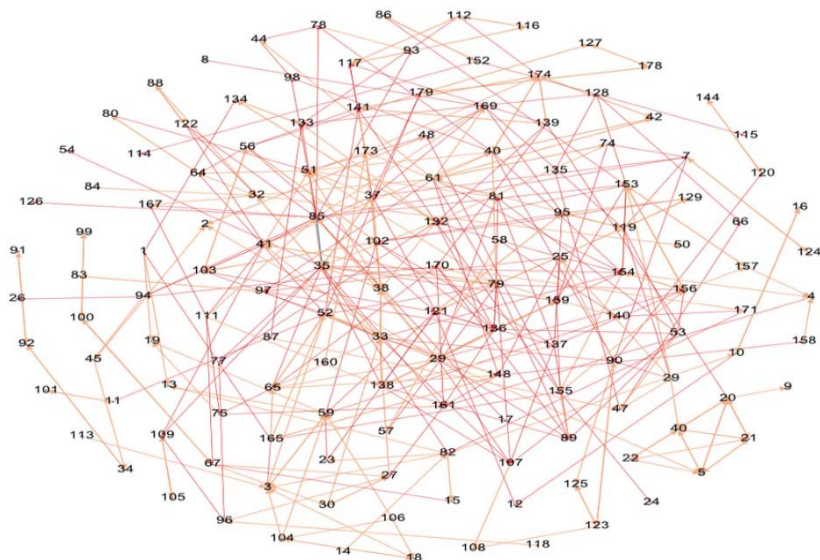## AI Program: HEALER

HIV Prevention Programs:
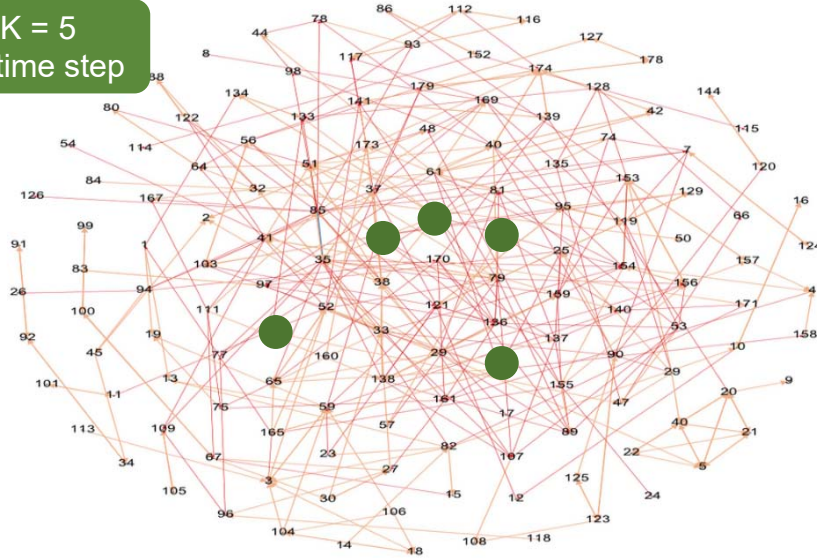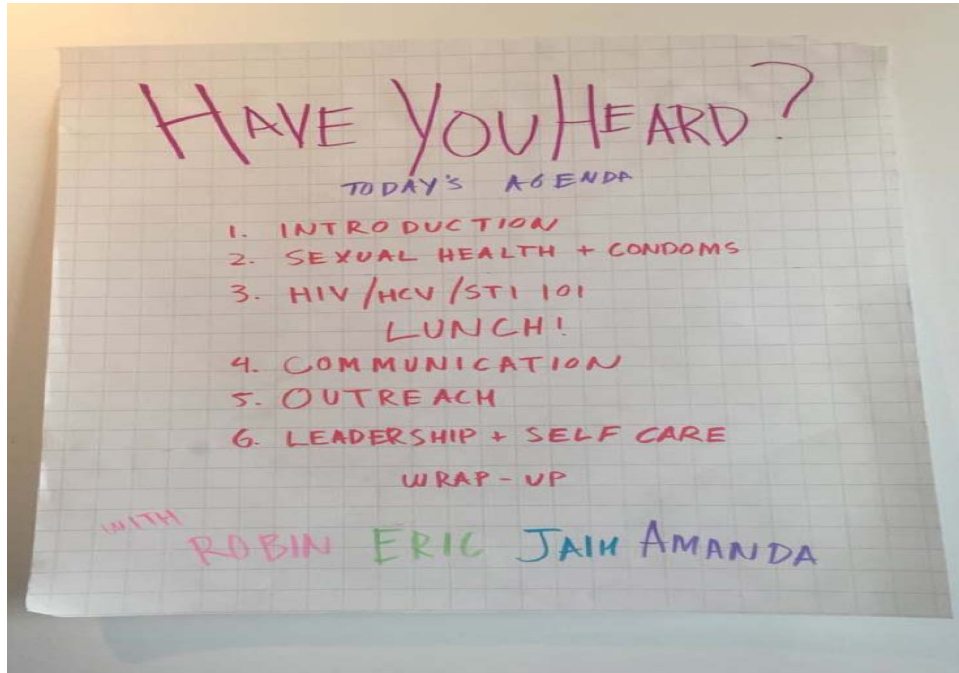## Using Social Networks to Spread HIV Information

Challenge: Adaptive selection in Uncertain Network

K = 5
1st time step
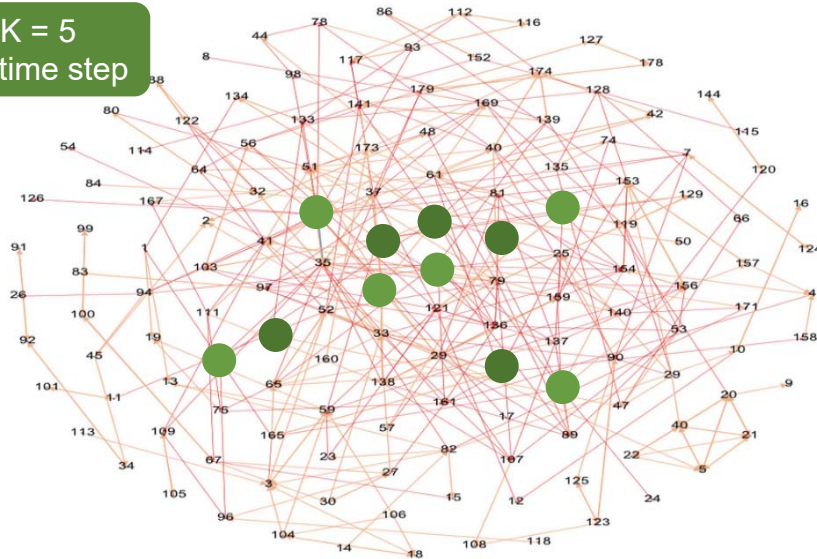
6/27/2017

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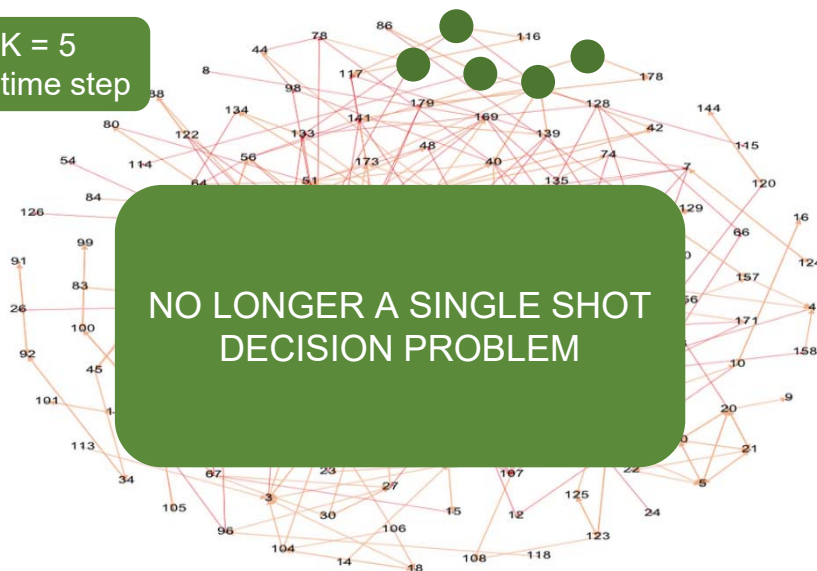## Challenge: Adaptive selection in Uncertain Network

K = 5
2nd time step

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Challenge 3 : Adaptive selection

K = 5
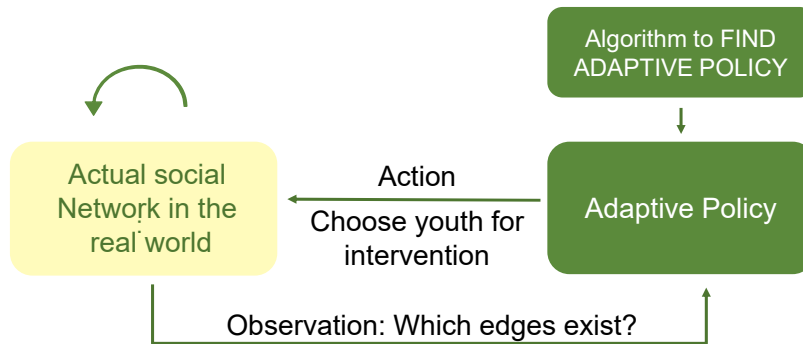3rd time step

NO LONGER A SINGLE SHOT
DECISION PROBLEM

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Creating an Adaptive Policy: "POMDP" [2015]
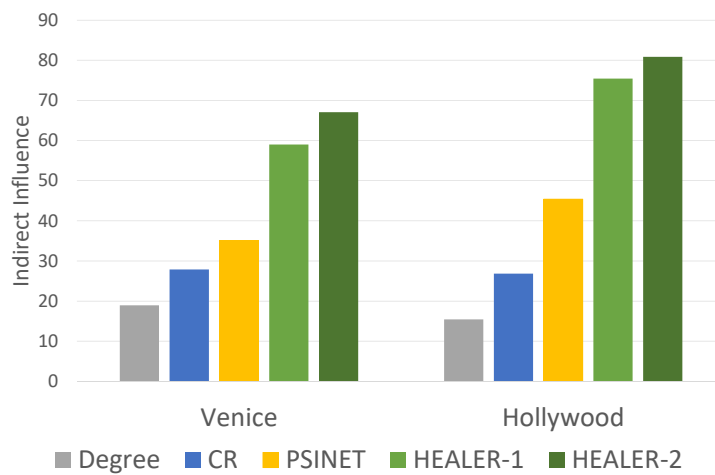
- Homeless shelters – sequentially select nodes under uncertainty
  - Policy driven by observations about edges

Algorithm to FIND ADAPTIVE POLICY

Adaptive Policy

Action
Choose youth for intervention

Actual social Network in the real world

Observation: Which edges exist?

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Real Networks – Simulation Results [2016-2017]

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Pilot Tests
with 170 Homeless Youth [2017]

Recruited youths:

HEALER	HEALER++	DEGREE CENTRALITY
62	56	55

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

(HEALER, HEALER++, Degree)

Informed Non-Peer Leaders Who Started Testing for HIV

- Testing
- Non-Testing
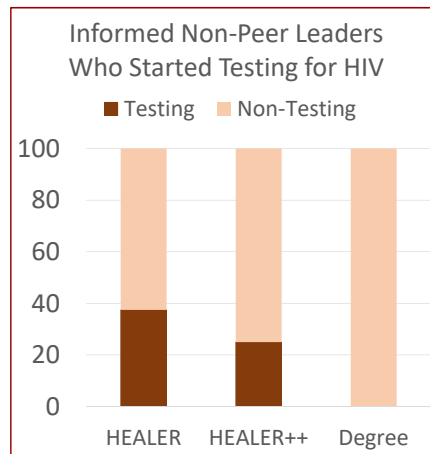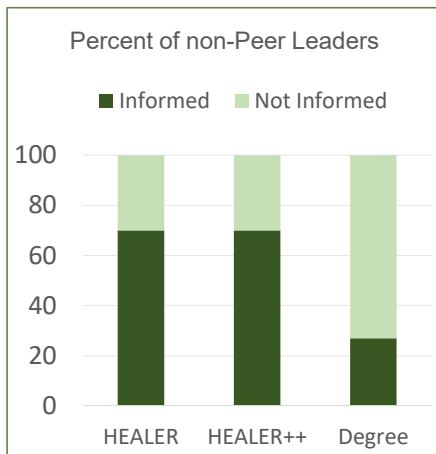
(HEALER, HEALER++, Degree)

AI Program: HEALER

Next Steps

- 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** *that they could be an* **agent for positive change***…."*

Eric Rice

Overview of CAIS Project Areas

AI for Assisting Low Resource Communities

- Substance abuse, suicide prevention…
- Modeling gang violence, matching homeless and homes…
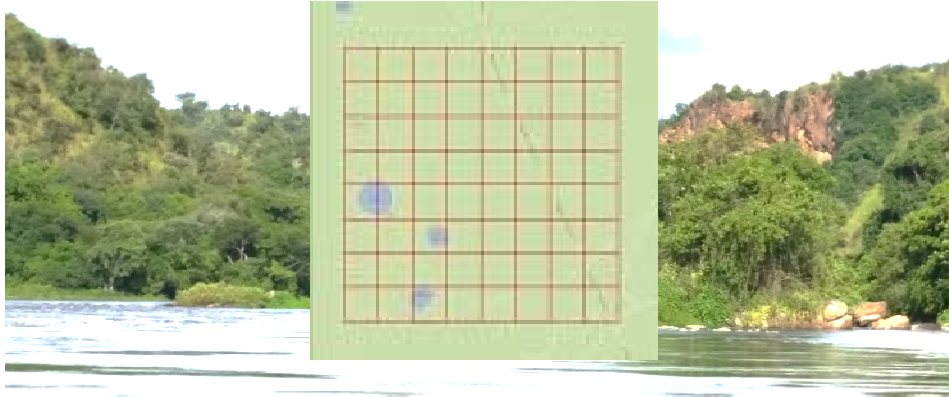
Protecting Wildlife in Uganda

PAWS: Applying AI for protecting wildlife

Poacher Behavior Prediction
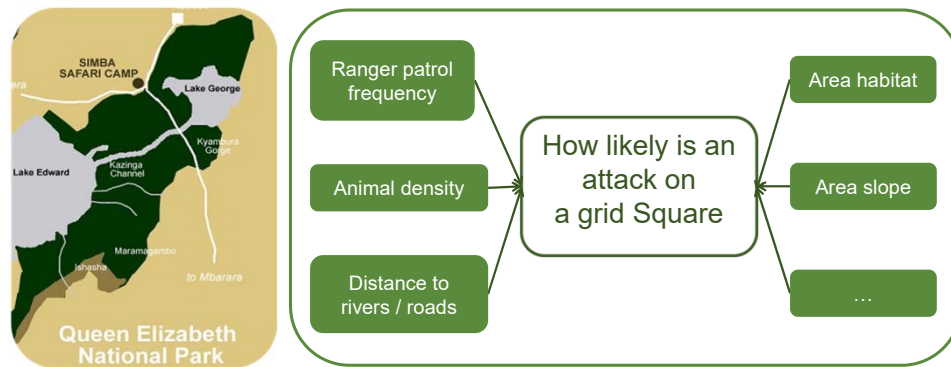
Predicting Poaching from Past Crime Data

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Poacher behavior prediction [2016]

Data from Queen Elizabeth National Park, Uganda

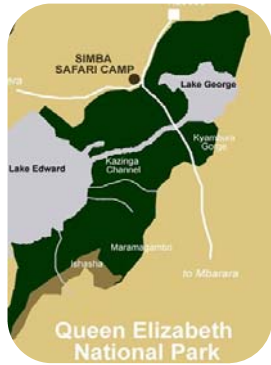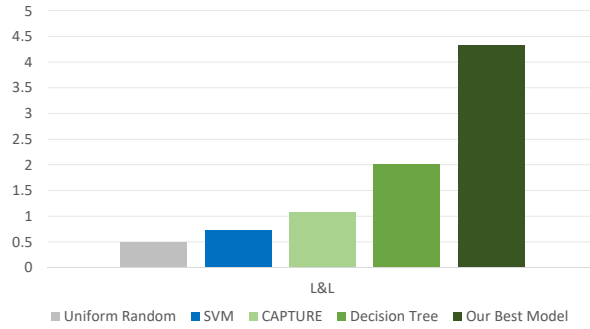Number of poaching attacks over 12 years: ~1000

Ranger patrol frequency

Animal density

Distance to rivers / roads

How likely is an attack on a grid Square

Area habitat

Area slope

…

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Poacher Attack Prediction [2017]

Poacher Behavior Prediction

Results from 2015

Legend: Uniform Random, SVM, CAPTURE, Decision Tree, Our Best Model

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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
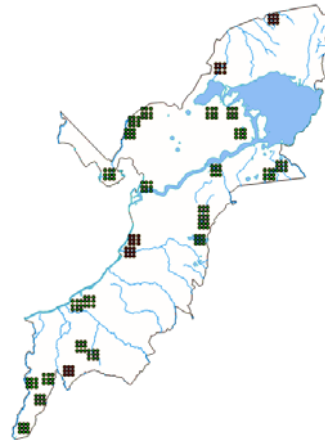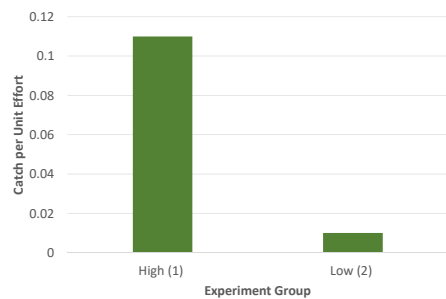- Snaring: 10 Antelope snares

Historical Base Hit Rate	Our Hit Rate
Average: 0.73	3

Real-world Deployment:
Field Test 2 (6 months) [2017]

- Catch Per Unit Effort (CPUE)
  - Unit Effort = km walked
  - Historical CPUE: **0.04**
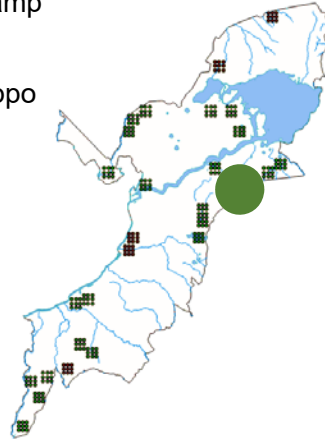 - Our high CPUE: **0.11**

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

AI for Social Good

THANK YOU

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Towards the Future: AI for Social Good

- Significant potential: AI for low resource communities, emerging markets

- Not just applications; novel research challenges:
  - Fundamental computational challenges from use-inspired research
  - Designing AI systems in society:
    - Interpretability
    - Complementing human autonomy

- Methodological challenges:
  - Encourage interdisciplinary research: measures impact in society