PAWS
Protection Assistant for Wildlife Security
What problem are you trying to solve?

Save the Wildlife from Poaching

Wildlife conservation agencies and national parks lack quality tool to design effective patrol routes to prevent poaching of wildlife in large size national parks.

Today ≈ 3,200

100 years ago≈ 60,000
How is the problem being addressed today?

**Human Designed Patrol Routes**
- Only use paper maps and past patrol routes and findings visualized in SMART etc
- Need to account for many different variables

**Limitations**
“In most parks, ranger patrols are poorly planned, reactive rather than pro-active, and habitual in their deployment”-- Emma Stokes (Conservation Scientist)
- Time consuming
- Human bias
- Once designed, no frequent update (used for months or years)
Why is AI better than the current solution?

**Reduce Cognitive Burden**
- Make more informed decision and design based on more information and analysis
- Less time needed
- Even less experienced manager can handle the task

**Make the Most Out of the Patrols**
- Exploits existing data to find patterns in poaching activities (Machine Learning)
- Account for the poachers’ adaptation to patrols and design targeted, proactive patrol routes (Game Theory)
What is the solution?

An AI system that helps park rangers design effective patrol routes to prevent poaching of wildlife in large size national parks.
What kinds of data does your solution need?

**Patrol Data + Geospatial Data**
- Past patrol routes and findings of poaching signs
- Location of villages, roads, rivers, etc.
- Slope, elevation, land cover
- Animal distribution

**Where and how are you getting these data?**
- For conservation sites that use SMART software to record the patrols and findings, patrol data can be extracted from there
- Geospatial data can either be provided by GIS experts or publicly available data source (often less accurate or less fine-grained)
What resources do you need to support the development, implementation, and maintenance of the solution?

**Technical**

GIS expert who can provide data and import the solution of PAWS
Data analyst to process the data
Computing resources to train the model and compute patrol route

**Non-Technical**

Domain experts to convey domain knowledge and provide feedback
- What kind of poachers they are facing? What factors do they consider?
- Which parts of the prediction/suggested route are not reasonable? Why?

We are fortunate to collaborate with people WWF, WCS, Panthera, UWA, Rimba.
What are the potential biases that AI may introduce or amplify in your context?

**Biased Historical Patrol**

Some areas have been patrolled much more frequently than others. As a result, AI's prediction is more reliable for those areas and areas that have similar features, and less reliable for others.

**Balance Exploration and Exploitation**

In the design of patrol routes, the AI-based solution should take into account the tradeoff between exploration and exploitation. (Need to address in the future)
What is your approach to maintaining the solution?

**Long-Term Collaboration**
Continued collaboration with WWF. Test on more sites. Explore and address more problems.

**Open Source Code Repository**
https://github.com/AIandSocialGoodLab/PAWS
Light-weighted & open-sourced

**Collaborate with Industry for Further Maintenance**
- Microsoft Research is leading the development of an API.
- SMART software development team is adding PAWS as a new feature in the next generation of the software.
Field Tests

Uganda (with WCS)

Malaysia (with Panthera and Rimba)

China (with WWF)
Video Demo (Open Source Version)
Call for Actions

- Help us spread the word about PAWS - please share this resource with your network especially those focused on conservation
- Contact me if you are interested in collaboration
- We're looking for high-resolution satellite imagery data for detecting (illegal) mining and logging sites, which contributes to the problem of poaching. Please contact us if you are interested in contributing data or using the resulting detection tool.