AI Article list Summaries

*Gabriel Rosser, Toby Davies, Kate J. Bowers, Shane D. Johnson, and Tao Cheng. 2016. Predictive Crime Mapping: Arbitrary Grids or Street Networks? (September 2016). Retrieved October 12, 2019 from* [*https://link.springer.com/article/10.1007/s10940-016-9321-x*](https://link.springer.com/article/10.1007/s10940-016-9321-x)

Theories in criminology, such as the “Law of crime concentration at places” suggest that that crime can be predictable. There are several analytic methods which help correlate the when and where of crime such as spatial crime concentration, space-time clustering and prospective mapping. This study analyzes a street network-based approach in predicting the crime in an area. the study looks at the accuracy and the effectiveness of this method in contrast with grid-based mapping alternatives.

When property crime in the UK Metropolitan area is taken as an example and Street network-based crime mapping is performed: The result demonstrates that it is the calibrated network-based model that is far more accurate. Approximately 20% more crime is identified at a level of 5 %. As well as the improvement in accuracy is highly statistically significant at all coverage levels(1% to 10%) tested, so we know, at least in the case of property crime, network-based models are more likely to perform better than grid-based models.

*Elizabeth R. Groff, Shane D. Johnson, and Amy Thornton. 2018. State of the Art in Agent-Based Modeling of Urban Crime: An Overview. (February 2018). Retrieved October 12, 2019 from* [*https://link.springer.com/article/10.1007/s10940-018-9376-y*](https://link.springer.com/article/10.1007/s10940-018-9376-y)

Agent-based modelling (ABM) can be an important tool for researching criminology through simulating crime patterns. This study examines the current literature to discuss the potential contributions of ABM, assess current practice, identify shortcomings that threaten the legitimacy of findings using ABM. Major databases were investigated to study the characteristics of the publication, the model and the agents, model purpose, crime type investigated, and interrogation of the model via sensitivity testing and validation.

After analyzing 45 publications, it was found that the following holds for most models: they were influenced by the opportunity theory framework, publications were lacking in detail, thus did not lend themselves to replication. Many did not follow a clear logic for modelling choices, parameter selection or calibration. Moreover, model validation was limited and inconsistent. And so, while, ABM possesses significant potential, the lack of model detail reported in publications, makes it harder to assess the process of development of models that reflect the actual conditions and offender decision-making, for prediction of crime.

*Rosés Brüngger, Raquel & Kadar, Cristina & Pletikosa, Irena. (2016). Design of an agent-based model to predict crime (WIP). 55. 10.22360/SummerSim.2016.SCSC.064. Retrieved October 12, 2019 from* [*https://www.researchgate.net/publication/316939645\_Design\_of\_an\_agent-based\_model\_to\_predict\_crime\_WIP*](https://www.researchgate.net/publication/316939645_Design_of_an_agent-based_model_to_predict_crime_WIP)

As crime prevention is one of the important facets of fighting crime, it is imperative that communities, practise effective methods for crime prevention. To accomplish this, police departments, all over the world, employ their efforts towards analyzing past crime data. This is done by identifying the more crime-prone areas and predict their evolution. By examining possibilities and building crime prediction models, by applying various techniques, from simple regression to more complex data mining.

This study presents the design of an Agent-Based Modeling (ABM) for predicting where and when future crimes will most likely occur. This paper advances the previous work by estimating offender behaviour and integrating a realistic representation of the environment; past crime data is incorporated to achieve automatic calibration. It is also assessed how crime data can be used to model the agent's conduct and the environmental data is included incrementally, to achieve a balance between prediction accuracy and complexity. The resulting ABM is developed as a crime prediction tool, and as an experimental environment to test prevention strategies.

*Tibor Bosse and Charlotte Gerritsen. 2008. Agent-Based Simulation of the Spatial Dynamics of Crime: On the Interplay between Criminal Hot Spots and Reputation. Retrieved October 12, 2019 from* [*https://www.cs.vu.nl/~tbosse/papers/AAMAS08\_crim.pdf*](https://www.cs.vu.nl/~tbosse/papers/AAMAS08_crim.pdf)

This paper attempts to discuss the Spatio-temporal dynamics of crime by offering an agent-based simulation model as an experimental medium to address such subjects. The simulation model particularly focuses on the hot spots as well as reputation. The model has been used to perform and formally analyze several simulations.

The results indicate that the presented approach can adequately reproduce displacement patterns as described in the literature. One such result is "In almost all of the simulations, the same repeating pattern was found: the passers-by move away from the criminals, the criminals follow the passersby, and the guardians follow the criminals. " This pattern is consistent with the displacement trends in criminological literature.

*Sylvia Thompson. 2018. 'Predictive policing' just a new spin on old law enforcement bias, critics say | CBC News. (September 2018). Retrieved October 12, 2019 from* [*https://www.cbc.ca/news/world/crime-los-angeles-predictive-policing-algorithms-1.4826030*](https://www.cbc.ca/news/world/crime-los-angeles-predictive-policing-algorithms-1.4826030)

Like most crime-fighting police departments, LAPD makes use of data analytics to help guide policing activity. However, the community has been put on edge by the predictive technologies used to try to get a jump on crime.

Softwares such as PredPol, which generates a map, predicting where crimes may occur, assist in deciding where to put scarce police resources to prevent crime from happening in the first place. Such software may dictate "where to allocate your resources, where to put your cars, where to put your personnel, to helping investigators solve a crime. And even for some risk management, like tracking police themselves, for performance reviews and different accountability reasons."

However, there are concerns over civil liberties issues. About implicit bias, and how citizens' data is collected and used by law-enforcement authorities. Critics distrust the kind of data that's feeding the predictions. There are no statistics available in this case, so it's hard to know if these softwares are effective, and whether the community is better off than before.

Brahan, John W., et al. “AICAMS: Artificial Intelligence Crime Analysis and Management System.” Knowledge-Based Systems, vol. 11, no. 5-6, 1998, pp. 355–361., doi:10.1016/s0950-7051(98)00064-1.

This paper focuses on the information processing aspect of policing. The researchers noted that data is gathered from investigations and stored for later referencing. Therefore, when an officer leaves a precinct, their expertise does not leave with them. It is available to view in the records of the cases they worked on. The researchers pointed out that the efficiency of an investigator laid in their ability to access and analyze information pertaining to the case. Therefore a computer system that is able to both retrieve and analyze information in a criminal investigation would likely be beneficial to an investigator. The AICAMS allows officers to access information about the case they are working on, and also shows them info that might be helpful with the investigation. Including; related incidents, suspicious nearby events, possible suspects, an activity summary, and a facial composite. This system allowed officers to access information faster, and also suggested helpful information. This allowed them to solve more undetected crimes, and also solve crimes faster.

Kursun, O., et al, “Development of an Artificial Intelligence System for Detection and Visualization of Auto Theft Recovery Patterns.” CIHSPS 2005. Proceedings of the 2005 IEEE International Conference on Computational Intelligence for Homeland Security and Personal Safety, 2005., doi:10.1109/cihsps.2005.1500605.

Auto theft is the most expensive property crime in Canada. This is because there are locations that people are leaving their vehicles that law enforcement was previously unaware of. This paper details a model that better predicts these auto drop-off locations. Because of the increased awareness of law enforcement of these before unseen drop off locations, they are better able to detect auto theft. The system was developed with the expert knowledge of investigators, and historical spatial and temporal auto theft data. A map interface allowed the user to visualize clusters of auo drop off locations and produce reports with more detail about auto thefts they were investigating. Applications like the one in this paper allow law enforcement officers to see a more geographic perspective of where auto thefts occur and thus, it helps them discover patterns in the crimes and take the necessary steps to prevent them.

“Uses for Artificial Intelligence.” Artificial Intelligence and Big Data, 2018, pp. 47–69., doi:10.1002/9781119426653.ch4.

This paper is about how Big Data allows for better analysis of existing data and the discovery of patterns in data. With more volume, variety, and velocity in the kinds of data that is collected, it is easier to find patterns in previously seemingly unrelated data. Using the methods developed in other fields where Big Data is used, police forces are able to collect better data and use this data to predict and prevent crime. The privacy issue comes into play when using Big Data, though. While the data collected may in and of itself not violate any privacy concerns, the sheer volume and the ability to analyze it and find patterns that show behaviour not explicitly in the data may raise some concerns.

Vomfell, Lara, et al. “Improving Crime Count Forecasts Using Twitter and Taxi Data.” SSRN Electronic Journal, 2018, doi:10.2139/ssrn.3131517.

This paper shows a multi-model approach to crime prediction. The aggregation of many different types of data, in the case of this paper; Twitter, FourSquare, taxi flow, and demographic data, allow for increased accuracy in the prediction of crime. The model developed in this paper uses the rolling-window approach to show robust evidence of new features accounting for hum activity. This improves the forecasts for crimes by showing local opportunities and locations where crimes may occur. Since the model does not rely on previous crime observations, it can generalize into areas where crimes have not been reported, and also where reporting rates are low. This model allows police forces to better focus their resources on potential problem areas, resulting in less man-power being required to solve and prevent an equal number of crimes.

Zhao, Xiangyu, and Jiliang Tang. “Crime in Urban Areas:” ACM SIGKDD Explorations Newsletter, vol. 20, no. 1, 2018, pp. 1–12., doi:10.1145/3229329.3229331.

Traditional methods of using historical data and demographic data to predict crime is ineffective. This paper uses fine-grained urban, mobile, and public service data that contains various crime-related sources as well as plenty of environmental and social information. By utilizing Big Data to analyze crime, it is easier to identify crime patterns and generate improved crime prediction models. With these models, crime prevention becomes more efficient and effective. The model in this paper allows police forces to better see where crime is most likely to happen, and thus they can better schedule patrol routes and sizes to better prevent crime.