

# NIJ Crime Forecasting Challenge Webinar

October 6, 2016

The webinar will begin shortly



# Important Info for the Webinar

- Today's webinar will be recorded and archived on the NIJ's website.
- This webinar is being live-captioned for the hearing impaired.
- You may listen to the webinar via phone or your computer. If you are having difficulty hearing the audio via the computer please try using a telephone instead.
- For technical assistance, please use the Chat Box. We will respond ASAP.
- Submit questions during the presentation by using the Q&A box and selecting all presenters. Questions will be answered during the Q&A portion.
- Challenge webpage referenced: **NIJ.gov/CrimeChallenge**

# Presenters

Howard Spivak, M.D.  
Principal Deputy Director

Joel Hunt  
Senior Computer Scientist

# National Institute of Justice (NIJ)

- Research, development, and evaluation agency of the U.S. Department of Justice.
- Dedicated to improving knowledge and understanding of crime and justice issues through science.
- Invests in scientific research across disciplines to serve the needs of the criminal justice community.

# Data Science Research at NIJ

- Principal focus on analysis and visualization of crime data
- Major role in the implementation of computer-based crime mapping and analysis in American Policing
- Timeline of data science activity:
  - 1986 grant award to University of Illinois at Chicago to explore mapping crime in the context of community policing. Included collaboration with the Chicago Police Department, Northwestern University, and the Chicago Alliance for Neighborhood Safety

## Data Science Research at NIJ (cont.)

- 1990 initiated the Drug Market Analysis Program
- 1997 funded development of CrimeStat
- 1997 established Crime Mapping Research Center. Later, the Mapping and Analysis for Public Safety Program
- 2009 began exploration of the potential of crime prediction/forecasting
- 2016 issued the Real-Time Crime Forecasting Challenge

# Crime Forecasting Challenge Goals

- Advance place-based crime forecasting.
- Engage data scientists not traditionally engaged in addressing the challenges of crime and justice, such as medical, economics, etc.
- Leverage data science advancements in other fields for application to criminal justice.
- Encourage an independent, comprehensive, comparative analysis of crime forecasting algorithms, techniques and/or products.

# Approach

- Based on locations listed in calls-for-service (CFS) data in Portland, OR, Police Bureau (PPB).
- Historical PPB CFS data Mar. 2012 – Feb. 2017 provided to contestants for algorithm development.
  - Released incrementally Sept. 2016 – Feb. 2017
- Contestant forecasts evaluated against PPB CFS data for Mar. – May 2017.
  - Released June 7, 2017
- The PPB CFS data can be found at the bottom of the Challenge [webpage](#).

## Approach (cont.)

- Contestants may use any other data sets or services that they believe would enhance the effectiveness or efficiency of their forecasts. Get creative!

*Note: A list of excluded addresses and CFS is found on the [webpage](#)*

# Entries

- Entry must address one or more of the four crime categories:
  - Burglary (residential and commercial)
  - Street Crime
  - Motor Vehicle Theft
  - All CFS
- For any or all of the five time periods
  - The first week in Mar. 2017
  - The first two weeks in Mar. 2017
  - The month of Mar. 2017
  - The two months of Mar. and Apr. 2017
  - The three months of Mar., Apr. and May 2017
- Contestants may submit only one entry that includes up to 20 total forecasts.

## Entries (cont.)

- The entry will be submitted in a .zip folder containing shapefiles that meet the requirements listed on the [webpage](#)

Table 2: Requirements for Entries

Requirement	Description of Requirement
Required files	.dbf .prj .sbn .sbx .shp .shx
Projection of files	NAD_1983_HARN_StatePlane_Oregon_North_FIPS_3601_Feet_Intl
Required variables	Unique ID for each cell A binary variable (1 – hot spot, 0 – not) Area for each cell measured in square feet to 4 decimal places
Cell shape	Any shape
Individual cell area*	62,500 ft <sup>2</sup> – 360,000 ft <sup>2</sup>
Total forecasted area	0.25 mi <sup>2</sup> – .75 mi <sup>2</sup>

\*Cells forming the outer boundary of the study area (Portland Police Districts, [see file in Section X.](#)) must be trimmed so that the total area of all cells equals 147.71 square miles (+/-0.02 square miles). The area of each interior cell must be equal to one another.

## Entries (cont.)

- Entries must be submitted through the Office of Justice Programs Grants Management System
- Registration and entry are free
- Registration and submission instructions are on the challenge [webpage](#)

# Judging Criteria

- Submissions will be judged on prediction effectiveness (accuracy) and efficiency.

## (A) Prediction Accuracy Index (PAI)

- The *PAI* will measure the effectiveness of the forecasts with the following equation:

$$PAI = \frac{n}{\frac{N}{\frac{a}{A}}}$$

- Where *n* equals the number of crimes that occur in the forecasted area, *N* equals the total number of crimes, *a* equals the forecasted area, and *A* equals the area of the entire study area.

## (B) Predictive Efficiency Index\* (PEI\*)

- The *PEI\** will measure the efficiency of the forecast with the following equation:

$$PEI^* = \frac{PAI}{PAI^*}$$

- Where *PEI\** equals the maximum obtainable *PAI* value for the amount of area forecasted, *a*. As such:

$$PEI^* = \frac{n}{n^*}$$

- Where *n\** equals the maximum obtainable *n* for the amount of area forecasted, *a*.

# Prizes

- Up to 120 prizes will be awarded; 40 each in three categories:
  - **Students** \$5,000—Enrolled as a full-time student in high school or as a full-time, degree seeking student in an undergraduate program.
  - **Small Teams / Businesses** \$10,000 per award—Team comprised of 1–20 individuals, or a small business with less than 21 employees.
  - **Large Businesses** \$15,000 per award—A business with more than 20 employees.
- All prizes will be awarded at the end of the competition.
- Contestants winning multiple prizes will receive one prize payment for the total amount.

# Prize Structure

		1 Week	2 Week	1 Month	2 Month	3 Month
<b>Burglary</b>	Effectiveness	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Efficiency	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
<b>Motor Vehicle Theft</b>	Effectiveness	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Efficiency	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
<b>Street Crime</b>	Effectiveness	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Efficiency	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
<b>All Calls-for-Service</b>	Effectiveness	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Efficiency	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000

- A contestant may win in more than one category in either effectiveness or efficiency or both.

*Note: the above table uses the Student category as an example. The Challenge will use the same prize structure for the Small Team/Business and Large Business categories, with the amounts \$10,000 and \$15,000, respectively, per prize.*

# Eligibility

- The Challenge is open to residents of the United States and its territories who are 13 years old at the time of entry.
  - Entries by contestants under the age of 18 must include the co-signature of the contestant's parent or legal guardian.
- Employees of NIJ and individuals or entities listed on the Federal Excluded Parties List are ineligible to participate.
  - Employees of other Federal Agencies should consult with their Ethics Officer concerning their eligibility.

# Key Dates

- Sept. 1, 2016, initial release of data for 03/01/12-07/31/16
- Sept. 7, 2016, release of data for 08/01/16-08/31/16
- Oct. 7, 2016, release of data for 09/01/16-09/30/16
- Nov. 7, 2016, release of data for 10/01/16-10/31/16
- Dec. 7, 2016, release of data for 11/01/16-11/30/16
- Jan. 7, 2017, release of data for 12/01/16-12/31/16
- Feb. 7, 2017, release of data for 01/01/17-01/31/17
- Feb. 17, 2017, release of data for 02/01/17-02/14/17
- Feb. 22, 2017, submission period begins
- Feb. 24, 2017, release of data for 02/15/17-02/21/17
- Feb. 27, 2017, release of data for 02/22/17-02/26/17
- Feb. 28, 2017, release of data for 02/27/17 and any data for 02/28/17 available at time of last upload (3 PM. ET)
- Feb. 28, 2017, submission period ends (11:59 PM ET)
- Mar. 6, 2017, release of any data for 02/27/17-02/28/17 not yet released
- Jun. 7th, 2017, release of data for 03/01/17-05/31/17

**Jun. 30, 2017, winners announced (anticipated)**



Please submit questions during the presentation by using the Q&A box and selecting all presenters.

## For more information:

Responses to questions posted on the [Challenge.gov](https://www.challenge.gov) discussions blog as well as those sent to NCJRS will be posted to the [FAQ section](#) of the Crime Challenge webpage, ( [NIJ.gov/CrimeChallenge](https://www.nij.gov/CrimeChallenge)). Sign up to get notified via email when FAQ's are posted.

Contact: National Criminal Justice Reference Service (NCJRS)

1-800-851-3420 (TTY: 301-240-6310 for hearing impaired only)

Email: [Grants@ncjrs.gov](mailto:Grants@ncjrs.gov)

Web chat: <https://webcontact.ncjrs.gov/ncjchat/chat.jsp>