

# Summary of *MACHINE LEARNING AS A TOOL FOR HYPOTHESIS GENERATION*

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## 1. What are the research questions?

- Whether novel and testable hypotheses can be generated by ML beyond human brain?

## 2. Why are the research questions interesting?

- Past studies think creative process is so human and seems to resist formalism.
- But there are two changes:
  - Machine learning algorithms can also find patterns;
  - Data on human behavior is exploding.
- This paper leverages these changes to expand how hypotheses are generated by ML.

## 3. What is the paper's contribution?

- Literature that studies hypothesis generation.
  - **Past studies:** hypothesis is generated based on existing theory and human brain;
  - **Expand:** use ML algorithms to generate human-interpretable hypotheses.
- Literature that uses ML to study economic and financial problems.
  - **Past studies:** use ML to get new measures and treat high-dimensional data;
  - **Expand:** generate hypothesis with the help of ML.

## 4. What hypotheses are tested in the paper?

- H1: ML can **extract something new** while using mug shot to predict judge behavior.

### a) Do these hypotheses follow from and answer the research questions?

- They partly answered the research question, but only focus on judge behavior case.

### b) Do these hypotheses follow from theory? Explain logic of the hypotheses.

- H1: ML can find patterns and notice new things not observed by people;

## 5. Sample: comment on the appropriateness of the sample selection procedures.

- This paper studied the data on 51,751 arrests from 2017 to 2020 in Mecklenburg county, USA. The sample only focuses on one county which is not so representative.

## 6. Comment on the appropriateness of variable definition and measurement.

- Dependent variables are judge detain decision and its prediction by ML algorithm, independent variables are factors that may explain like gender and skin. Variables are measured well except those generated from experiment which may be distorted.

## 7. Comment on the appropriateness of the regress/predict model specification.

- The model is specified well since ample variables are controlled and std is clustered by ID. This paper could also control ID FE to gain robuster specification.

## 8. What difficulties arise in drawing inferences from the empirical work?

- This paper only studied one case about judge behavior and I doubt whether the procedure can be adopted in other cases well?
- Experiment itself may distort subjects' belief and influence empirical results.

**9. Describe at least one publishable and feasible extension of this research.**

- This paper uses video data to study facial features, but gesture, language, voice and sentiment are also important.
- A similar research: use LLMs to find novel ideas and get new hypotheses that are ignored by prior studies while analysing textual materials.
  - Fund prospectuses' feature can influence investors' sensitivity to fund's skill.
  - Existing channel: specific.
  - Maybe LLMs can figure out other important interpretable features of prospectuses.