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USPS Case Study

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- https://www.youtube.com/watch?v=RmSJLVoILnM#ddg-play
- https://www.youtube.com/watch?v=FQsvcZbVwlw#ddg-play
- https://www.nbcnews.com/video/full-speech-biden-announces-measures-to-combat-omicron-variant-129307717622
  14:30- free test kits would be made available.

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Free COVID Test Kits

THE WHITE HOUSE

Administration The Record Briefing Room Visit Español MENU

JANUARY 14, 2022

Fact Sheet: The Biden Administration to Begin Distributing At-Home, Rapid COVID-19 Tests to Americans for Free

BRIEFING ROOM › STATEMENTS AND RELEASES

The Biden Administration is Buying One Billion Tests to Give to Americans for Free; Online Ordering of a Half-Billion Tests Begins on January 19th; Builds on Significant Actions to Expand Testing Capacity and Increase Access to Free Testing

Testing is an important tool to help mitigate the spread of COVID-19. Public health experts and the Centers for Disease Control and Prevention recommend that Americans use at-home tests if they begin to have symptoms, at least five days after coming in close contact with someone who has COVID-19, or are gathering indoors with a group of people who are at risk of severe disease or unvaccinated.

To help ensure Americans have tests on hand if a need arises, the Biden Administration is purchasing one billion at-home, rapid COVID-19 tests to give to Americans for free. A half-billion tests will be available for order on

- Announce free test kits 21 DEC 2021
- Announce the USPS will deliver kits 14 JAN 2022
- Website available 19 JAN 2022
- ~300K address resolution errors

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Business Address

- **Description:** Test kits were only available to residential addresses, not business addresses. If an address was identified as a business, it was flagged and prevented from receiving kits.
- **Example:**
  - **Address:** 123 Main St, Suite 200.
  - **Issue:** The address is registered as an office building or commercial establishment rather than a residential property.
  - **Resolution:** The system would reject the request or flag it for manual review to determine eligibility.

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Shared Address

- **Description:** Multiple households might share the same address (e.g., apartment complexes or housing units), and the system sometimes treated them as a single unit, limiting test kits.
- **Example:**
  - **Address:** 456 Elm St, Apt 3A and 456 Elm St, Apt 3B.
  - **Issue:** The system might interpret these as duplicate requests for the same base address (456 Elm St).
  - **Resolution:** Additional details (e.g., apartment or unit numbers) were required to distinguish households.

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Multiple Address

- **Description:** Some properties had multiple valid addresses due to aliasing or historical records, leading to confusion or duplicate flags.
- **Example:**
  - **Address:** 789 Maple Ave and 789 Maple Drive.
  - **Issue:** Both addresses refer to the same property, but the system treated them as two distinct households or flagged one as a duplicate.
  - **Resolution:** Address standardization tools resolved aliases to a single primary address.

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Duplicate Address

- **Description:** The same address was submitted multiple times by different residents or by the same household trying to request more than the allowable number of kits.
- **Example:**
  - **Address:** 1010 Pine St.
  - **Issue:** John Doe and Jane Doe both submitted requests for the same address, resulting in duplicate submissions.
  - **Resolution:** The system flagged and processed only one request per household.

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Other

- **Description:** Miscellaneous issues that didn't fit into the other categories, such as incomplete, improperly formatted, or unverifiable addresses.
- **Example:**
  - **Address:** PO Box 123 or "Corner of Oak St and 2nd Ave."
  - **Issue:** A PO Box was provided instead of a physical residential address, or the address lacked sufficient detail to be validated by USPS systems.
  - **Resolution:** These cases required manual review or clarification from the requester.

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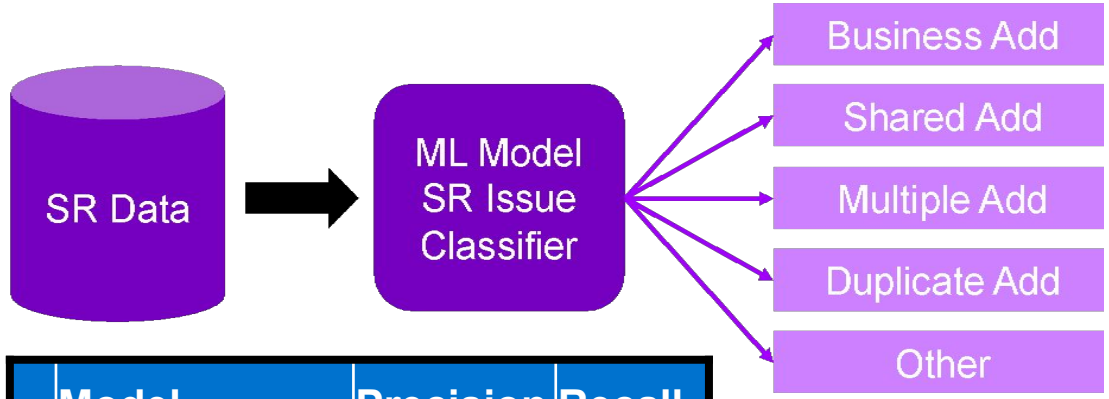
An AI/NLP Application to Resolve Service Requests (SR)

AI NLP to resolve 300K requests for missed service



	Model	Precision	Recall
1	Regression	78.5	77
2	SVM	81	80
3	Naive Bayes	74.2	73
4	Decision Tree	76.5	75
5	Random Forest	83.5	82
6	Neural Network	82	81

150 randomly sampled cases
- 2 USPS workers reviewed 50 cases
- Agreed on 42/50 cases
- 84% Agreement

USPS could/would not resolve disagreement

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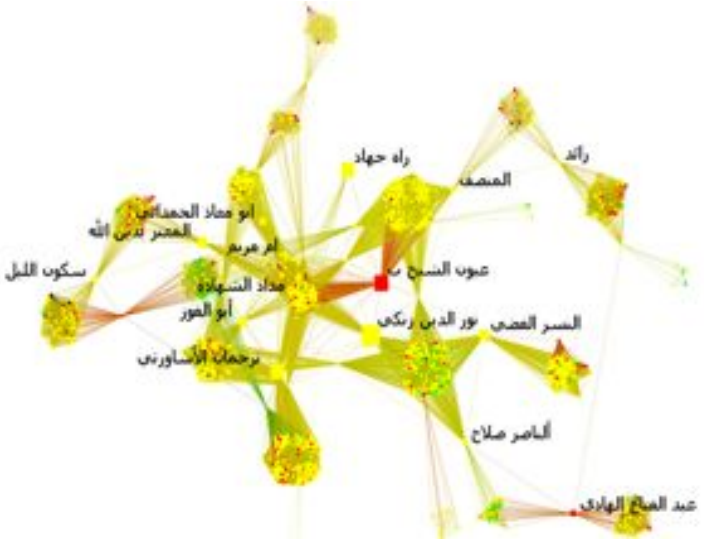
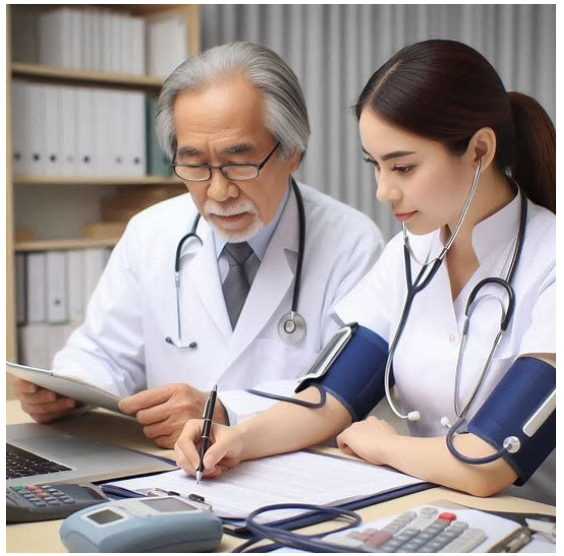
Expert Humans Often Disagree

Address resolution
Disagreement = 17%



Online Extremism
Disagreement = 32%



Hypertension Claim
Missing Data = 72%

Inter-annotator agreement (IAA) measures the level of consistency in data labeling.

Data label consistency improves AI/ML precision in classification.

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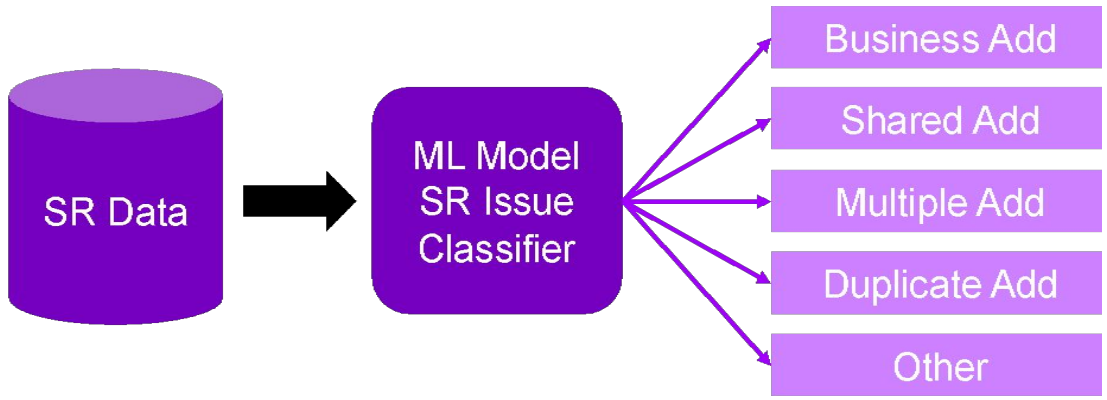
HOW DO YOU IMPLEMENT DECISIONS SR RESOLUTION

AI NLP to resolve 300K requests for missed service



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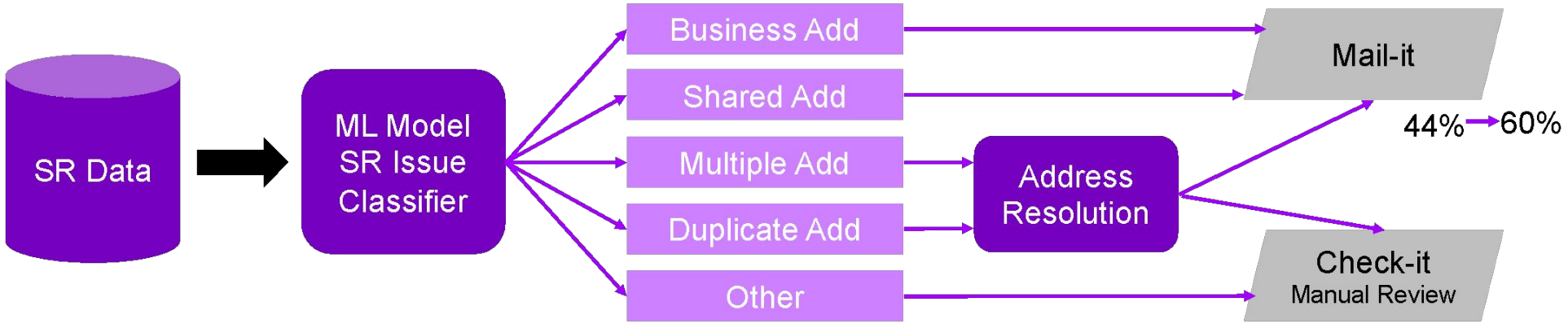
SERVICE REQUEST RESOLUTION

AI NLP to resolve 300K requests for missed service



Address resolution used regular expression (REGEX) to resolve ambiguity in the address

Accuracy improves from ~84% to 97% (mail v check)

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REGEX Examples

1. **Data Preprocessing**
    1. Clean and standardize address formatting (e.g. case, punctuation, abbreviations).
    2. Use libraries like usaddress to parse addresses into components.
2. **Normalization**
    1. Use a service like USPS's API or libraries to normalize addresses to a standard format.
    2. Example: Convert "123 Elm Street Apt 2B" to "123 Elm St #2B."
3. **Duplicate Detection**
    1. Compare cleaned and normalized addresses, fuzzy matching, near-exact duplicates.
4. **Alias Resolution**
    1. Check against database of known aliases.
5. **Validation**
    1. Use USPS's address verification API or similar tools to confirm that the normalized address exists and is valid.

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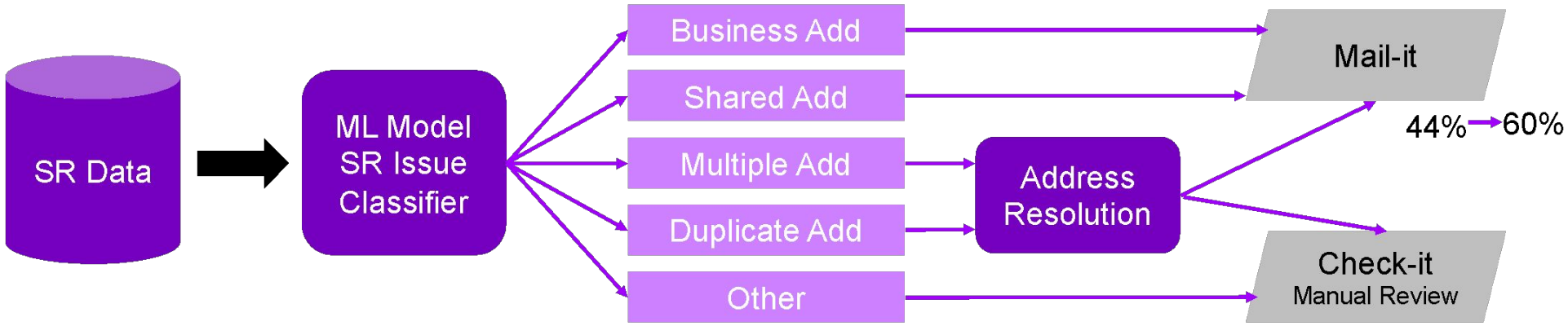
How Do You Implement Decisions?



Collaboration between business leaders and technical leaders, where both engage in problem solving can lead to more creative solutions to achieve real business end-goals.

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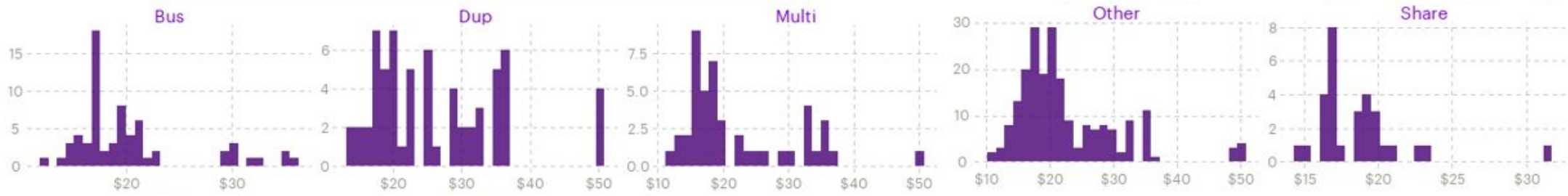
Responsible/Ethical AI

EQUITY ANALYSIS

SR's, especially "multi" and "other" impact economically disadvantaged households at greater frequency.



From a responsible and ethical AI perspective, those that were most affected by address resolution issues were the most economically disadvantaged. Should we use AI?

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Summary

- AI can provide a valuable tool for resolving a wide range of business problems.
- It is common for AI practitioners to try multiple algorithms and select the best performing.
- Performance, especially precision, is often limited by consistency in training data.
- High quality, consistent labeling is a business problem, not a technology problem.
- Successful business – technology communication can open creative solutions.
- It is common that failure to adopt AI in favor of status-quo is an unethical choice.

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