HARNESSING AI AND ML IN OFFICIAL STATISTICS:

THE SORS EXPERIENCE

Transforming Statistical Operations through Advanced Technology at the Statistical Office of the Republic of Serbia (SORS)

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Introduction to AI and ML in Official Statistics

- AI and ML are revolutionizing official statistics by automating complex processes, improving data accuracy, and enabling real-time analysis.

- These technologies have advanced from basic machine learning models to sophisticated systems like Large Language Models (LLMs).

- The integration of AI/ML not only enhances efficiency but also opens new possibilities for using unconventional data sources, contributing to timely statistical outputs.

Overview of SORS's Digital Census

- The 2022 Census marked Serbia's first fully digital census, integrating AI and ML throughout the data collection and processing stages.

- SORS enhanced data accuracy, reduced costs, and sped up the census process by adopting a digital approach.

- This digital transition set a new standard for census operations in Serbia, showcasing the potential of AI and ML in revolutionizing statistical practices.

ML in the Post-Enumeration Phase

- SORS used Machine Learning to classify occupations and economic activities based on ISCO and NACE classifications.

- ML automated the traditionally labor-intensive classification process, ensuring quicker and more accurate results.

- The models were trained on large datasets that included variables like education, age, and gender, improving classification precision.

Data Anonymization and Cloud Processing

- SORS used cloud-based infrastructure to efficiently process large datasets for ML tasks, ensuring scalability and security.

- Data was anonymized before cloud processing to protect sensitive information, maintaining respondent privacy.

- The cloud environment, equipped with high-performance hardware, allowed SORS to handle complex ML algorithms swiftly.

ML Model Training and Data Sources

- Training began with data from the 2011 census, enhanced with ongoing surveys like the Labour Force Survey and the Central Register of Mandatory Social Insurance (administrative source in Serbia).

- These diverse data sources provided a robust training set for accurate classification of occupations and activities.

- Combining multiple data sources allowed SORS to create a reliable ML model, addressing potential biases with varied demographic factors.

IST’s Role in Enhancing AI/ML Efficiency

- Seamless Data Collection:

IST's advanced functionalities, including efficient data collection and robust logical controls, ensured that high-quality, clean data was available for AI/ML processing.

- Modern Architecture:

IST's architecture, built on MS SQL DB Server, provided a stable and scalable foundation, minimizing the need for extensive preprocessing before AI/ML applications.

- Improved AI/ML Performance:

By starting with well-structured, accurate data, IST significantly enhanced AI/ML performance, reducing resource requirements and ensuring project viability.

- Avoiding GIGO:

IST’s capabilities helped us avoid the common pitfall of 'Garbage In, Garbage Out,' leading to more reliable and actionable insights from our AI/ML models

ML Algorithms Used

- SORS tested and selected the Random Forest classifier for its superior accuracy in classifying occupations and activities.
- The Random Forest model achieved 98% accuracy, a critical factor in ensuring high-quality census data.
- This algorithm was ideal for handling the diverse and complex data collected during the census.

Achievements in Classification Accuracy

- The Random Forest classifier improved occupation and activity classification accuracy, achieving a 98% accuracy rate.
- This high accuracy was validated against manually coded samples, ensuring reliable results.
- These improvements enhanced the overall quality of the census data, providing a solid foundation for future statistical operations.

Practical Benefits of AI and ML in the Census

- AI and ML reduced processing time and errors by automating classification tasks, ensuring consistent data quality.

- These technologies enabled SORS to handle large datasets more efficiently, making the census process faster and cost-effective.

- The integration of AI and ML in the census highlighted their potential for broader applications in official statistics.

Challenges Faced and Lessons Learned

- Challenges included data quality issues with OCR text and the computational demands of ML model training.

- SORS developed secondary ML models for text correction and optimized cloud resources to address these challenges.

- These solutions provided valuable lessons for future projects, equipping SORS with the knowledge to enhance AI and ML use.

AI and ML Applications in Global NSOs: Statistics Canada

- Statistics Canada uses ML to automate survey response coding, resulting in faster processing times and improved data accuracy.

- ML reduced the need for manual coding, minimizing errors and streamlining operations.

- This approach demonstrates the versatility and effectiveness of ML in the statistical domain.

AI and ML Applications in Global NSOs: ONS (UK)

- ONS in the UK has used AI for business activity classification, improving the accuracy and timeliness of economic statistics.

- AI applications enabled ONS to process and analyze large datasets more efficiently, providing reliable data for economic policies.

- This success highlights AI's potential to revolutionize statistical data collection and processing.

Future Directions for AI and ML at SORS

- SORS plans to expand AI/ML use to other statistical domains, including environmental and social statistics.

- Future initiatives will involve collaboration with other NSOs and international organizations to share best practices.

- SORS is committed to leading AI and ML innovation in statistics, enhancing data accuracy, efficiency, and relevance.

Ethical Considerations & Best Practices

- Adherence to global ethical standards ensures responsible and transparent use of AI/ML in official statistics.

- SORS has developed guidelines for ethical AI deployment, focusing on fairness, accountability, and transparency.

- These guidelines prevent biases, protect privacy, and ensure AI benefits to all stakeholders in the statistical process.

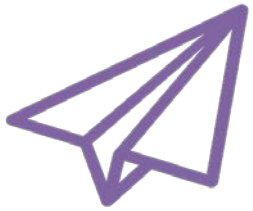
Conclusion and Q&A

- SORS's 2022 census demonstrated the transformative power of AI/ML in official statistics, setting a new standard for digital data collection.

- SORS is committed to continuing AI/ML innovation, working with global partners to advance these technologies in statistics.

- This presentation highlighted SORS's achievements and challenges with AI/ML, and we welcome any questions or discussions.

Contact Information



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