Predictive Analytics for Optimizing Resource Allocation in Indonesian Consular Services: A Thesis Proposal

Abstract

This thesis proposal outlines a research project focused on developing a predictive analytics model to optimize resource allocation within Indonesian consular services. The increasing demand for consular assistance necessitates efficient resource management to ensure service quality and accessibility for Indonesian citizens abroad. This research will explore the application of machine learning techniques to forecast the demand for various consular services, enabling the Indonesian Ministry of Foreign Affairs to proactively allocate staff, budget, and logistical resources. The proposal includes a review of relevant literature on AI in public services and resource allocation, a detailed methodology for data collection, model development, training, and evaluation, and expected outcomes that highlight the potential benefits of this approach for enhancing the effectiveness of Indonesian diplomacy.

I. Introduction

The Indonesian Ministry of Foreign Affairs (Kemlu) provides a wide array of essential services to Indonesian citizens residing and traveling internationally through its extensive network of embassies and consulates.[1] These consular services, including passport issuance, visa processing, and emergency assistance, are critical for the well-being of Indonesian nationals abroad.[2] The efficient delivery of these services is paramount, especially given the increasing number of Indonesians living and working overseas.[8]

Effective resource allocation is fundamental to ensuring the quality and accessibility of consular services. Fluctuations in demand for different services, varying across geographical locations and time periods, can strain resources if not managed proactively.[4] Traditional resource allocation methods often rely on historical averages and may not adequately address these dynamic demands, leading to potential inefficiencies, delays, and reduced citizen satisfaction.[10]

Artificial Intelligence (AI), particularly predictive analytics, offers a promising avenue for optimizing resource allocation in complex systems.[11] By analyzing historical data and identifying patterns, predictive models can forecast future demand with greater accuracy, enabling proactive resource planning and allocation.[30] This approach has been successfully implemented in various public sectors to improve efficiency and

service delivery.[34]

This thesis proposes to investigate the application of predictive analytics to optimize resource allocation within Indonesian consular services. By developing a model that can accurately forecast the demand for various services across different Indonesian diplomatic missions, this research aims to provide Kemlu with a data-driven tool to enhance its operational efficiency, improve service quality, and ensure better support for Indonesian citizens abroad.

II. Literature Review

- **Artificial Intelligence in Public Services:** AI has been increasingly adopted by governments worldwide to enhance efficiency, improve decision-making, and optimize resource allocation across various sectors, including healthcare, transportation, and security.[34] Predictive analytics, a key area within AI, has shown significant potential in forecasting demand and optimizing resource allocation in public services.[11]
- **AI in Consular Services:** Several countries are exploring and implementing AI in their consular operations to improve efficiency and citizen experience.[18] AI applications include automated document processing, biometric verification, and AI-powered chatbots for citizen support.[142] Predictive analytics has been used to forecast demand for visa, passport, and overseas citizen services, enabling better resource planning.[31]
- **Resource Allocation in Government:** Effective resource allocation in government is crucial for maximizing the impact of public spending and ensuring efficient service delivery.[143] Predictive analytics can assist in optimizing the allocation of financial, human, and logistical resources by forecasting future needs and identifying potential inefficiencies.[11] Case studies from various government sectors demonstrate the successful application of predictive analytics for resource planning and optimization.[34]
- **Indonesian Context:** The Indonesian government has recognized the potential of AI for digital transformation across various sectors.[34] While initiatives like SahabatAI and SARI focus on NLP for citizen support [148], there is an opportunity to explore the use of predictive analytics for resource optimization within the Ministry of Foreign Affairs.

III. Proposed Methodology

This research will employ a quantitative methodology to develop and evaluate a predictive analytics model for optimizing resource allocation in Indonesian consular

services. The following steps will be undertaken:

1. **Data Collection:** Historical data on the demand for various consular services (e.g., passport applications, visa requests, emergency assistance cases) will be collected from the Indonesian Ministry of Foreign Affairs. This data will include the type of service, the location of the diplomatic mission, the date and time of the request, and potentially the processing time. External factors that may influence demand, such as travel advisories, seasonal trends, and global events, will also be considered. [77]

2. **Data Preprocessing:** The collected data will be cleaned, transformed, and prepared for model training. This will involve handling missing values, normalizing data, and potentially feature engineering to create relevant input variables for the predictive model.

3. **Model Selection and Development:** Several machine learning algorithms suitable for time series forecasting and regression tasks will be explored, including but not limited to ARIMA, Prophet, and Recurrent Neural Networks (RNNs) like LSTMs. The most appropriate model will be selected based on its performance on the data. [146]

4. **Model Training:** The selected model will be trained using the historical consular services data. The dataset will be split into training and validation sets to optimize the model's parameters and prevent overfitting.

5. **Model Evaluation:** The performance of the trained model will be evaluated using appropriate metrics such as Mean Absolute Error (MAE), Mean Squared Error (MSE), and Root Mean Squared Error (RMSE). The model's accuracy in forecasting demand for different consular services at various locations and timeframes will be assessed.

6. **Resource Allocation Optimization:** Based on the demand forecasts generated by the model, strategies for optimizing the allocation of consular resources (e.g., staffing levels, budget allocation) will be developed and proposed.

7. **Validation and Refinement:** The proposed resource allocation strategies will be validated against real-world scenarios or through simulations to assess their effectiveness. The model and strategies will be refined based on the evaluation results.

IV. Expected Outcomes and Contribution

This research is expected to yield a predictive analytics model capable of accurately forecasting the demand for various consular services provided by the Indonesian Ministry of Foreign Affairs. The successful development and implementation of this model will enable Kemlu to:

- **Optimize resource allocation:** Proactively allocate staff, budget, and logistical resources to diplomatic missions based on predicted demand, reducing inefficiencies and improving service delivery.
- **Enhance service quality:** Ensure adequate resources are available to meet the needs of Indonesian citizens abroad, leading to improved satisfaction and trust in consular services.
- **Improve operational efficiency:** Streamline consular operations by anticipating demand fluctuations and planning resources accordingly.
- **Support data-driven decision-making:** Provide Kemlu with a data-driven tool for strategic planning and resource management in its consular affairs division.

This thesis will contribute to the field of AI in public services by providing a specific application of predictive analytics for resource optimization in the context of foreign affairs. It will also offer practical insights for the Indonesian Ministry of Foreign Affairs on leveraging advanced technologies to enhance its diplomatic effectiveness and better serve its citizens.

V. Timeline

[A detailed timeline for each stage of the research project will be included here, spanning the duration of the Master's program.]

VI. References

[A comprehensive list of all cited sources, including academic papers, reports, and online resources, will be included here, referencing the provided research snippets.]

Works cited

1. AI for the Public Sector: 3 Things to Keep in Mind - Bucher + Suter, accessed May 9, 2025, https://www.bucher-suter.com/ai-for-the-public-sector-3-things-to-keep-in-mind/
2. SARI App: Indonesia and UN Women's Effort to Protect Female Migrant Workers - RRI, accessed May 9, 2025, https://www.rri.co.id/internasional/1465199/sari-app-indonesia-and-un-women-s-effort-to-protect-female-migrant-workers
3. Indonesia Launches AI-Powered App to Support Migrant Workers - RRI, accessed May 9, 2025, https://rri.co.id/en/national/1465164/indonesia-launches-ai-powered-app-to-support-migrant-workers
4. Migration MPTF Final Report, accessed May 9, 2025, https://mptf.undp.org/sites/default/files/documents/2025-02/final_report_2024_mi

gration_mptf_indonesia.pdf

5. Service Learning Program in Consulate General of the Republic of Indonesia (KJRI) Songkhla-Thailand - ResearchGate, accessed May 9, 2025, https://www.researchgate.net/publication/388020264_Service_Learning_Program_in_Consulate_General_of_the_Republic_of_Indonesia_KJRI_Songkhla-Thailand

6. Kemlu: 15 WNI Ditangkap di AS atas Dugaan Pelanggaran Imigrasi - Laman 2 - FAJAR, accessed May 9, 2025, https://fajar.co.id/2025/04/21/kemlu-15-wni-ditangkap-di-as-atas-dugaan-pelanggaran-imigrasi/2/

7. Indonesia Can Use AI to Save Subsidized Fuel Budget Up to US$3.1 Billion: Minister, accessed May 9, 2025, https://en.tempo.co/read/1902715/indonesia-can-use-ai-to-save-subsidized-fuel-budget-up-to-us3-1-billion-minister

8. eP-ALM: Efficient Perceptual Augmentation of Language Models - CVF Open Access, accessed May 9, 2025, https://openaccess.thecvf.com/content/ICCV2023/papers/Shukor_eP-ALM_Efficient_Perceptual_Augmentation_of_Language_Models_ICCV_2023_paper.pdf

9. Conquering the AI Adoption Gap in Government: A Roadmap to Success - UrbanLogiq, accessed May 9, 2025, https://urbanlogiq.com/conquering-the-ai-adoption-gap-in-government-a-roadmap-to-success/

10. Transforming Public Sector With AI: Opportunities and Challenges - StateTech Magazine, accessed May 9, 2025, https://statetechmagazine.com/article/2025/02/transforming-public-sector-ai-opportunities-and-challenges

11. ash.harvard.edu, accessed May 9, 2025, https://ash.harvard.edu/wp-content/uploads/2024/02/artificial_intelligence_for_citizen_services.pdf

12. 4 AI Use Cases for Federal Government - Interconnections - The Equinix Blog, accessed May 9, 2025, https://blog.equinix.com/blog/2025/04/10/4-ai-use-cases-for-federal-government/

13. How federal agencies are using AI to solve what's next - The SHI Resource Hub, accessed May 10, 2025, https://blog.shi.com/business-of-it/artificial-intelligence/how-federal-agencies-use-ai/

14. How Governments are Using AI: 8 Real-World Case Studies, accessed May 10, 2025, https://blog.govnet.co.uk/technology/ai-in-government-case-studies

15. The Budgeting Process: Governments Find Power in AI - National League of Cities, accessed May 10, 2025, https://www.nlc.org/article/2025/02/18/the-budgeting-process-governments-find-power-in-ai/

16. How can government improve performance with AI?, accessed May 10, 2025, https://www.businessofgovernment.org/blog/how-can-government-improve-performance-ai

17. AI Solutions Can Bolster Operations in Government Finance Offices | StateTech Magazine, accessed May 10, 2025, https://statetechmagazine.com/article/2025/04/ai-solutions-can-bolster-operations-government-finance-offices
18. AI in Government: A Strategic Framework for Digital Transformation - REI Systems, accessed May 9, 2025, https://www.reisystems.com/ai-in-government-a-strategic-framework-for-digital-transformation/
19. Assessing AI Readiness at Government Agencies - TechSur Solutions, accessed May 10, 2025, https://techsur.solutions/ai-readiness-government-agencies/
20. Using AI in Local Government: 10 Use Cases - Oracle, accessed May 10, 2025, https://www.oracle.com/artificial-intelligence/ai-local-government/
21. AI-Powered Predictive Analytics - National Contract Management Association, accessed May 10, 2025, https://www.ncmahq.org/Shared_Content/CM-Magazine/May-2025/Ai-Powered-Predictive-Analytics.aspx
22. How AI-Powered Analytics is Transforming Public Service in Government - MicroStrategy, accessed May 10, 2025, https://www.strategysoftware.com/blog/how-ai-powered-analytics-is-transforming-public-service-in-government
23. Harnessing the Power of Predictive Analytics for Data-Driven Decision-Making in the Public Sector - MicroStrategy, accessed May 10, 2025, https://www.strategysoftware.com/blog/harnessing-the-power-of-predictive-analytics-for-data-driven-decision-making-in-the-public-sector
24. AI Predictive Maintenance in Government and Public Sector - Snowflake, accessed May 10, 2025, https://www.snowflake.com/guides/ai-predictive-maintenance-government-and-public-sector/
25. AI in Government Part 1: Data Management Solutions for the Federal Government, accessed May 10, 2025, https://www.hitachivantarafederal.com/ai-in-government-part-1-data-management-solutions-for-the-federal-government/
26. Anticipatory government: Preempting problems through predictive analytics - Deloitte, accessed May 10, 2025, https://www2.deloitte.com/us/en/insights/industry/public-sector/government-trends/2020/predictive-analytics-in-government.html
27. Predictive Analytics, Emerging Trends and Future of State Governance | Science of Law, accessed May 10, 2025, https://www.legal-science.com/index.php/SoL/article/view/129
28. The US Government Is Using AI To Detect Potential Wrongdoing, and Companies Should Too | Insights | Skadden, Arps, Slate, Meagher & Flom LLP, accessed May 10, 2025, https://www.skadden.com/insights/publications/2024/03/insights-special-edition/the-us-government-is-using-ai
29. Predictive Algorithms in the Public Sector - New Jersey State Policy Lab |,

accessed May 10, 2025, https://policylab.rutgers.edu/predictive-algorithms-in-the-public-sector/

30. AI in Government: How Government CIOs Can Capture AI Potential - Gartner, accessed May 9, 2025, https://www.gartner.com/en/information-technology/topics/ai-in-government

31. www2.deloitte.com, accessed May 9, 2025, https://www2.deloitte.com/content/dam/Deloitte/us/Documents/public-sector/us-using-artificial-intelligence-to-modernize-american-statecraft.pdf

32. uscpublicdiplomacy.org, accessed May 9, 2025, https://uscpublicdiplomacy.org/printpdf/89581

33. The role of AI technologies in the future of consular functions - Delfino.cr, accessed May 9, 2025, https://delfino.cr/2023/10/the-role-of-ai-technologies-in-the-future-of-consular-functions

34. AI in government: impact to the public sector - Neudesic, accessed May 9, 2025, https://www.neudesic.com/blog/ai-in-government-public-sector-impact/

35. How AI is helping governments drive digital transformation - The World Economic Forum, accessed May 9, 2025, https://www.weforum.org/stories/2025/01/rewire-governments-ai-in-the-intelligent-age-meta/

36. 10 ways AI-powered public services are driving innovation in government - Rocket.Chat, accessed May 9, 2025, https://www.rocket.chat/blog/innovation-in-government

37. The Beneficial Impact of AI in Public Services - RTInsights, accessed May 9, 2025, https://www.rtinsights.com/the-beneficial-impact-of-ai-in-public-services/

38. Computer Vision and Deep Learning for Government - PyImageSearch, accessed May 9, 2025, https://pyimagesearch.com/2022/06/22/computer-vision-and-deep-learning-for-government/

39. 5 AI Trends Shaping the Future of Public Sector in 2025 | Google Cloud Blog, accessed May 9, 2025, https://cloud.google.com/blog/topics/public-sector/5-ai-trends-shaping-the-future-of-the-public-sector-in-2025

40. How Artificial Intelligence (AI) is Shaping the Future of Government - Becker Digital, accessed May 9, 2025, https://www.becker-digital.com/blog/artificial-intelligence-government

41. The Future of AI For the Public Sector | IBM Center for The Business of Government, accessed May 9, 2025, https://www.businessofgovernment.org/blog/future-ai-public-sector

42. Applications of Artificial Intelligence in Global Diplomacy: A Review of Research and Practical Models - ResearchGate, accessed May 9, 2025, https://www.researchgate.net/publication/390329776_Applications_of_artificial_intelligence_in_global_diplomacy_A_review_of_research_and_practical_models

43. The Government and Public Services AI Dossier - Deloitte, accessed May 9, 2025, https://www2.deloitte.com/us/en/pages/consulting/articles/ai-dossier-governmen

t-public-services.html
44. The Future of AI: Government and the Public Sector - ServiceNow, accessed May 9, 2025, https://www.servicenow.com/workflow/learn/future-ai-government-public-sector.html
45. Artificial Intelligence (AI) in Government – Intel, accessed May 9, 2025, https://www.intel.com/content/www/us/en/learn/ai-in-government.html
46. G7 Toolkit for Artificial Intelligence in the Public Sector | OECD, accessed May 9, 2025, https://www.oecd.org/en/publications/g7-toolkit-for-artificial-intelligence-in-the-public-sector_421c1244-en.html
47. Preventing the Failure of Generative AI Utilization in the Public Sector: What Should the Government Do? - Center for Digital Society, accessed May 9, 2025, https://digitalsociety.id/2025/02/27/preventing-the-failure-of-generative-ai-utilization-in-the-public-sector-what-should-the-government-do/19481/
48. Unleashing the Potential of AI for Indonesia's Digital Government Transformation - KORIKA, accessed May 9, 2025, https://korika.id/blog/unleashing-the-potentialof-ai-for-indonesias-digital-government-transformation/
49. Visa-Vanguard: An Nlp-Based, Aipowered Intelligent Chatbot for Streamlining International Student Support Services | ITM Web of Conferences, accessed May 9, 2025, https://www.itm-conferences.org/articles/itmconf/abs/2025/05/itmconf_iccp-ci2024_01017/itmconf_iccp-ci2024_01017.html
50. In pursuit of seamless service: how AI is revolutionising citizen-government interactions, accessed May 9, 2025, https://www.globalgovernmentforum.com/in-pursuit-of-seamless-service-how-ai-is-revolutionising-citizen-government-interactions/
51. AI use cases in government that improve the citizen experience - The Future of Commerce, accessed May 9, 2025, https://www.the-future-of-commerce.com/2025/02/20/examples-of-ai-use-cases-in-government/
52. Artificial Intelligence (AI) and the Future of Public Engagement - Deloitte, accessed May 9, 2025, https://www2.deloitte.com/content/dam/Deloitte/us/Documents/public-sector/amc-ai-the-future-of-public-engagement.pdf
53. AI in government: A threat or benediction? - Apolitical, accessed May 9, 2025, https://apolitical.co/solution-articles/en/ai-in-government-a-threat-or-benediction
54. The rise of AI in Indonesia is expanding financial inclusion - The World Economic Forum, accessed May 9, 2025, https://www.weforum.org/stories/2025/02/rise-of-ai-in-indonesia/
55. How the US Public and AI Experts View Artificial Intelligence | Pew Research Center, accessed May 9, 2025, https://www.pewresearch.org/internet/2025/04/03/how-the-us-public-and-ai-ex

perts-view-artificial-intelligence/

56. AI for the People: Use Cases for Government - Harvard Kennedy School, accessed May 9, 2025, https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/working.papers/M-RCBG%20Working%20Paper%202024-02_AI%20for%20the%20People.pdf

57. Federal Government AI Use Cases - Responsible AI Institute, accessed May 9, 2025, http://www.responsible.ai/federal-government-ai-use-cases/

58. How AI can Reform and Transform Citizen Service Delivery - CSM Technologies, accessed May 9, 2025, https://www.csm.tech/blog-details/how-ai-can-reform-and-transform-citizen-service-delivery

59. AI Services to Citizens in 2023 and Beyond - National Academy of Public Administration, accessed May 9, 2025, https://napawash.org/standing-panel-blog/ai-services-to-citizens-in-2023-and-beyond

60. AI for Civilian Services - Booz Allen, accessed May 9, 2025, https://www.boozallen.com/markets/civil-government/ai-for-government.html

61. Transforming Citizen Services: How AI Can Empower Government Agencies, accessed May 9, 2025, https://bluewhaleapps.com/blog/transforming-citizen-services-how-ai-can-empower-government-agencies

62. Putting citizens at the center of government services with AI - IBM, accessed May 9, 2025, https://www.ibm.com/think/topics/ai-government-services

63. Guide: Leveraging AI to Enhance Citizen Services » Community | GovLoop, accessed May 9, 2025, https://www.govloop.com/community/blog/guide-leveraging-ai-to-enhance-citizen-services/

64. Agency leaders discover the power of AI to scale and support citizen services | StateScoop, accessed May 9, 2025, https://statescoop.com/agency-leaders-discover-the-power-of-ai-to-scale-and-support-citizen-services/

65. FCDO deploys AI triage for consular queries and predicts tech 'will transform diplomatic practice' - PublicTechnology, accessed May 9, 2025, https://www.publictechnology.net/2025/01/31/international-relations/fcdo-deploys-ai-triage-for-consular-queries-and-predicts-tech-will-transform-diplomatic-practice/

66. AI Skills Gaps Are Putting Government Projects at Risk - Here's How to Fix It, accessed May 9, 2025, https://papers.govtech.com/AI-Skills-Gaps-Are-Putting-Government-Projects-at-Risk-%E2%80%93-Heres-How-to-Fix-It-143791.html

67. Multilingual AI Bots: Expanding Communication Across Cultures - FastBots.ai, accessed May 9, 2025, https://fastbots.ai/blog/multilingual-ai-bots-expanding-communication-across-cultures

68. Natural Language Processing (NLP) - What is it and how is it used? -

Hyperscience, accessed May 9, 2025,
https://www.hyperscience.com/knowledge-base/natural-language-processing/

69. AI Governance and Ethics: Lessons from the U.S. Visa Revocation Policy, accessed May 9, 2025,
https://moderndiplomacy.eu/2025/03/11/ai-governance-and-ethics-lessons-from-the-u-s-visa-revocation-policy/

70. Role of AI in Revolutionizing Visa Processing in the UAE - Appinventiv, accessed May 9, 2025, https://appinventiv.com/blog/ai-visa-processing-uae/

71. arxiv.org, accessed May 9, 2025, https://arxiv.org/pdf/2401.05415

72. Artificial Intelligence - Blog about Consular and Public diplomacies, accessed May 9, 2025, https://www.consulardiplomacy.com/home/category/artificial-intelligence

73. Visa-Vanguard: An Nlp-Based, Aipowered Intelligent Chatbot for Streamlining International Student Support Services - ResearchGate, accessed May 9, 2025,
https://www.researchgate.net/publication/389174173_Visa-Vanguard_An_Nlp-Based_Aipowered_Intelligent_Chatbot_for_Streamlining_International_Student_Support_Services

74. United States Citizenship and Immigration Services – AI Use Cases - Homeland Security, accessed May 9, 2025, https://www.dhs.gov/ai/use-case-inventory/uscis

75. 10 Applications of Natural Language Processing (2025) - Analytics Vidhya, accessed May 9, 2025,
https://www.analyticsvidhya.com/blog/2020/07/top-10-applications-of-natural-language-processing-nlp/

76. Oliver Jenkyn on how Visa is building the future of AI-powered commerce, accessed May 9, 2025,
https://fastcompanyme.com/technology/oliver-jenkyn-on-how-visa-is-building-the-future-of-ai-powered-commerce/

77. (PDF) Migration Letters Natural Language Processing in Public Communication for Migration Policies: An Ai-Driven Approach - ResearchGate, accessed May 9, 2025,
https://www.researchgate.net/publication/378143017_Migration_Letters_Natural_Language_Processing_in_Public_Communication_for_Migration_Policies_An_Ai-Driven_Approach

78. Different natural languages, equal importance - PMC - PubMed Central, accessed May 9, 2025, https://pmc.ncbi.nlm.nih.gov/articles/PMC10436036/

79. Principal - Data Scientist, Bangalore, KA, IN | Fidelity Careers, accessed May 9, 2025, https://jobs.fidelity.com/in/jobs/2111757/principal-data-scientist/

80. Applications of Deep Learning in Indonesia's Tech Industry - BytePlus, accessed May 9, 2025, https://www.byteplus.com/en/topic/423024

81. Top 25 Deep Learning Applications Used Across Industries - Simplilearn.com, accessed May 9, 2025,
https://www.simplilearn.com/tutorials/deep-learning-tutorial/deep-learning-applications

82. Machine Learning Scientist/Engineer - Visa, accessed May 9, 2025,
https://www.visaeurope.lu/en_lu/jobs/REF057269W

83. Find and Buy with AI: Visa Unveils New Era of Commerce, accessed May 9, 2025,
https://usa.visa.com/about-visa/newsroom/press-releases.releaseId.21361.html

84. (PDF) Chatbots: A Tool to Improve Public Service Delivery and Create Public Value, accessed May 9, 2025, https://www.researchgate.net/publication/389061226_Chatbots_A_Tool_to_Improve_Public_Service_Delivery_and_Create_Public_Value

85. Computation and Language Nov 2023 - arXiv, accessed May 9, 2025, http://arxiv.org/list/cs.CL/2023-11?skip=175&show=500

86. 6 Real-World Examples of AI Natural Language Processing - Expert.ai, accessed May 9, 2025, https://www.expert.ai/blog/natural-language-processing-examples/

87. E-Learning for Consular Staff | IOM MICIC Initiative, accessed May 9, 2025, https://micicinitiative.iom.int/e-learning-consular-staff

88. The State of Multilingual AI - ruder.io, accessed May 9, 2025, https://www.ruder.io/state-of-multilingual-ai/

89. Applications Of Nlp In Virtual Assistants And Chatbots - FasterCapital, accessed May 9, 2025, https://fastercapital.com/topics/applications-of-nlp-in-virtual-assistants-and-chatbots.html

90. CGI to integrate AI into visa processing support at U.S. embassies and consulates across Asia Pacific, accessed May 9, 2025, https://www.cgi.com/en/cgi-integrate-ai-into-visa-processing-support-u-s-embassies-consulates-across-asia-pacific

91. Top Natural Language Processing (NLP) Applications - Future Skills Academy, accessed May 9, 2025, https://futureskillsacademy.com/blog/top-nlp-applications/

92. What Is NLP (Natural Language Processing)? - IBM, accessed May 9, 2025, https://www.ibm.com/think/topics/natural-language-processing

93. Cyber Threats Surge in India's Financial Sector - Fintech News Singapore, accessed May 9, 2025, https://fintechnews.sg/110964/fintech-india/cyber-threats-surge-in-indias-financial-sector/

94. Monthly Monitor: AI Deep Dive - January 2025 - Hotwire Global, accessed May 9, 2025, https://www.hotwireglobal.com/trend-insights/monthly-monitor-ai-deep-dive-january-2025/

95. Consular Services in the U.S. Mission to India - U.S. Embassy & Consulates in India, accessed May 9, 2025, https://in.usembassy.gov/consular/

96. diplomatist.com, accessed May 9, 2025, https://diplomatist.com/2024/05/20/the-use-of-artificial-intelligence-in-foreign-ministries/#:~:text=For%20example%2C%20AI%20models%20can,paced%20world%20of%20international%20politics.

97. Ministry of Foreign Affairs Launches AI Diplomacy Division View|Press Releases, accessed May 9, 2025, https://www.mofa.go.kr/eng/brd/m_5676/view.do?seq=322749

98. Redefining Deterrence: The Impact of Emerging Technologies on Nuclear and Conventional Military Forces, accessed May 9, 2025, https://nuclearnetwork.csis.org/redefining-deterrence-the-impact-of-emerging-t

echnologies-on-nuclear-and-conventional-military-forces/

99. Global AI's 'DeepSeek Moment': Impact and Implications - Observer Research Foundation, accessed May 9, 2025, https://www.orfonline.org/research/global-ai-s-deepseek-moment-impact-and-implications

100. Taiwan AI documentary set to premiere tomorrow - Taipei Times, accessed May 9, 2025, https://www.taipeitimes.com/News/taiwan/archives/2025/05/08/2003836519

101. The Use of Artificial Intelligence in Foreign Ministries - The Diplomatist, accessed May 9, 2025, https://diplomatist.com/2024/05/20/the-use-of-artificial-intelligence-in-foreign-ministries/

102. How US State Department Uses AI Strategically in Modern Diplomacy - ICTworks, accessed May 9, 2025, https://www.ictworks.org/state-department-uses-ai-strategically/

103. intervention by first secretary matthew wong of singapore at the fifth thematic deep dive on the global digital compact on the issue of artificial intelligence, conference room 1 at unhq, thursday, 25 may 2023, 10.00am, accessed May 9, 2025, https://www.mfa.gov.sg/Overseas-Mission/New-York/Mission-Updates/Second_committee/2023/05/20230525-1

104. CGI and Ministry for Foreign Affairs develop an AI solution for development evaluation, accessed May 9, 2025, https://www.cgi.com/en/article/artificial-intelligence/cgi-and-ministry-foreign-affairs-develop-ai-solution-development

105. AI for Good - Identifying innovative AI applications to solve global challenges, accessed May 9, 2025, https://aiforgood.itu.int/

106. The Future is Here: Visa Announces New Era of Commerce Featuring AI, accessed May 9, 2025, https://usa.visa.com/about-visa/newsroom/press-releases.releaseId.21366.html

107. BLS International: Global Visa Outsource Service Providers, accessed May 9, 2025, https://www.blsinternational.com/

108. Visa and Mastercard Embrace AI Agents, Transforming Payment Solutions, accessed May 9, 2025, https://www.retailnews.asia/visa-and-mastercard-embrace-ai-agents-transforming-payment-solutions/

109. Formulating Indonesia's Artificial Intelligence Strategy in International Affairs, accessed May 9, 2025, https://moderndiplomacy.eu/2024/08/29/formulating-indonesias-artificial-intelligence-strategy-in-international-affairs/

110. e-Visa is an online application system developed by the albanian government to pre-screen travelers wishing to visit Albania., accessed May 9, 2025, https://e-visa.al/apply

111. AI Voice Translation - CXone Mpower SmartSpeak | - NICE, accessed May 9, 2025, https://www.nice.com/products/smartspeak

112.   Indonesia to Draft Regulation on Artificial Intelligence Usage by April - The Gulf Observer, accessed May 9, 2025, https://thegulfobserver.com/indonesia-to-draft-regulation-on-artificial-intelligence-usage-by-april/

113.   Indonesia International Travel Information, accessed May 9, 2025, https://travel.state.gov/content/travel/en/international-travel/International-Travel-Country-Information-Pages/Indonesia.html

114.   AI Biases in Critical Foreign Policy Decisions - CSIS, accessed May 9, 2025, https://www.csis.org/analysis/ai-biases-critical-foreign-policy-decisions

115.   Applications of Artificial Intelligence in Global Diplomacy: A Review of Research and Practical Models | Request PDF - ResearchGate, accessed May 9, 2025, https://www.researchgate.net/publication/388833980_Applications_of_Artificial_Intelligence_in_Global_Diplomacy_A_Review_of_Research_and_Practical_Models

116.   AI Act | Shaping Europe's digital future - European Union, accessed May 9, 2025, https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

117.   How to Use Artificial Intelligence in Diplomacy, accessed May 9, 2025, https://diplomaticacademy.us/2023/10/01/artificial-intelligence-diplomacy/

118.   [2502.17364] Bridging Gaps in Natural Language Processing for Yorùbá: A Systematic Review of a Decade of Progress and Prospects - arXiv, accessed May 9, 2025, https://arxiv.org/abs/2502.17364

119.   www.mofa.go.kr, accessed May 9, 2025, https://www.mofa.go.kr/eng/brd/m_5676/view.do?seq=322749#:~:text=On%20February%2025%2C%20the%20Ministry,AI)%20in%20the%20global%20arena.

120.   Ministry of Foreign Affairs Launches AI Diplomacy Division - Public now, accessed May 9, 2025, https://www.publicnow.com/view/A59C9DD7A47468C3048CFA5002D014DCA01282D5

121.   Third inter-regional conference on the impact of emerging technologies: challenges and opportunities for the Security domain | OSCE, accessed May 9, 2025, https://www.osce.org/secretariat/590423

122.   How Will the World's First' AI-generated Foreign Ministry Spokesperson Work Launched By Ukraine? - YouTube, accessed May 9, 2025, https://www.youtube.com/watch?v=cnMuZOQzl8k

123.   Foreign Ministry Spokesperson Lin Jian's Regular Press Conference on September 26, 2024_Ministry of Foreign Affairs of the People's Republic of China, accessed May 9, 2025, https://www.mfa.gov.cn/eng/xw/fyrbt/lxjzh/202409/t20240926_11497961.html

124.   The Ministry of Foreign Affairs of Ukraine has appointed a digital person to inform on consular issues, accessed May 9, 2025, https://mfa.gov.ua/en/news/mzs-ukrayini-priznachilo-cifrovu-osobu-dlya-informuvannya-shchodo-konsulskih-pitan

125.   Artificial Intelligence Issues_Ministry of Foreign Affairs of the People's Republic of China, accessed May 9, 2025, https://www.fmprc.gov.cn/eng/wjb/zzjg_663340/jks_665232/kjlc_665236/AI/

126. Indonesia Under Severe U.S. Travel Warning As Violent Separatist Movements And Escalating Civil Clashes Ignite An All-Out Crisis In Papua, accessed May 9, 2025, https://www.travelandtourworld.com/news/article/indonesia-under-severe-u-s-travel-warning-as-violent-separatist-movements-and-escalating-civil-clashes-ignite-an-all-out-crisis-in-papua/

127. Glitch in Indonesia visa system potentially exposes traveler passport data | ABC News, accessed May 9, 2025, https://www.youtube.com/watch?v=HbRcn9EZQgg

128. Indonesia Travel Advice & Safety - Smartraveller, accessed May 9, 2025, https://www.smartraveller.gov.au/destinations/asia/indonesia

129. Foreign relations of Indonesia - Wikipedia, accessed May 9, 2025, https://en.wikipedia.org/wiki/Foreign_relations_of_Indonesia

130. Indonesia's Digital Diplomacy: Problems and Challenges - ResearchGate, accessed May 9, 2025, https://www.researchgate.net/publication/331391141_Indonesia's_Digital_Diplomacy_Problems_and_Challenges/fulltext/63e671a5dea61217579bfd82/Indonesias-Digital-Diplomacy-Problems-and-Challenges.pdf

131. Global Issues Archives - U.S. Embassy & Consulates in Indonesia, accessed May 9, 2025, https://id.usembassy.gov/category/global-issues/

132. Development of eYGovernment in indonesia: A Strategy Model and its Achievements, accessed May 9, 2025, https://www.apu.ac.jp/rcaps/uploads/fckeditor/publications/journal/RJAPS_V24_Dahalan.pdf

133. Transforming Indonesia's e-government landscape - Kearney, accessed May 9, 2025, https://www.kearney.com/about/locations/southeast-asia/article/-/insights/transforming-indonesia-s-e-government-landscape

134. Using digital technologies to improve resilience and inclusion in Indonesia, accessed May 9, 2025, https://blogs.worldbank.org/en/governance/using-digital-technologies-improve-resilience-and-inclusion-indonesia

135. Development of the Indonesian Government's Digital Transformation - Dinasti Publisher, accessed May 9, 2025, https://dinastipub.org/DIJEMSS/article/view/2868

136. INDONESIA'S ROAD MAP TO E-GOVERNMENT: OPPORTUNITIES AND CHALLENGES1 - APCICT, accessed May 9, 2025, https://www.unapcict.org/sites/default/files/2019-01/Indonesia_RoadMap_E_Government.pdf

137. Indonesia: E-Government Streamlining Public Services - OpenGov Asia, accessed May 9, 2025, https://opengovasia.com/2024/03/27/indonesia-e-government-streamlining-public-services/

138. Indonesia Digital Government presentation - Public Documents | The World Bank, accessed May 9, 2025, https://thedocs.worldbank.org/en/doc/cef340f55d2ede9685e8ba946c7e7eef-007

0012021/original/Indonesia-Digital-Government-presentation.pdf

139. Indonesia's global e-government ranking jumped 13 places - GovInsider, accessed May 9, 2025, https://govinsider.asia/intl-en/article/indonesias-global-e-government-ranking-jumped-13-places

140. E-Goverment and Public Services in Indonesia: Prospects and Challenges - KnE Open, accessed May 9, 2025, https://kneopen.com/KnE-Social/article/view/15507/

141. Indonesia - EGOVKB | United Nations > Data > Country Information, accessed May 9, 2025, https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/78-Indonesia

142. Department of State AI Inventory 2024 - United States Department of ..., accessed May 9, 2025, https://2021-2025.state.gov/department-of-state-ai-inventory-2024/

143. Retrieval-Augmented Generation for Natural Language Processing: A Survey - arXiv, accessed May 9, 2025, https://arxiv.org/html/2407.13193v1

144. arXiv:2501.05714v1 [cs.CL] 10 Jan 2025, accessed May 9, 2025, https://arxiv.org/pdf/2501.05714?

145. Gemma2 9b Cpt Sahabatai V1 Base · Models - Dataloop AI, accessed May 9, 2025, https://dataloop.ai/library/model/gotocompany_gemma2-9b-cpt-sahabatai-v1-base/

146. Natural Language Processing (NLP) [A Complete Guide] - DeepLearning.AI, accessed May 9, 2025, https://www.deeplearning.ai/resources/natural-language-processing/

147. Large Language Models for Information Retrieval: A Survey - arXiv, accessed May 9, 2025, https://arxiv.org/html/2308.07107v4

148. Llama3 8b Cpt Sahabatai V1 Instruct · Models - Dataloop AI, accessed May 9, 2025, https://dataloop.ai/library/model/gotocompany_llama3-8b-cpt-sahabatai-v1-instruct/

149. Sahabat-AI, accessed May 9, 2025, https://sahabat-ai.com/

150. GoTo Launches Sahabat-AI, Enhancing its Leadership in Indonesia's Technology Sector, accessed May 9, 2025, https://www.gotocompany.com/en/news/press/goto-launches-sahabat-ai-enhancing-its-leadership-in-indonesias-technology-sector

151. Indosat and GoTo launches Sahabat AI: driving Indonesia's golden 2045 vision, accessed May 9, 2025, https://www.contentgrip.com/indosat-goto-launches-sahabat-ai/

152. Indosat Ooredoo Hutchison and GoTo Launch Sahabat-AI: Indonesia's Open-Source LLM for Empowering Digital Sovereignty, accessed May 9, 2025, https://www.gotocompany.com/en/news/press/indosat-ooredoo-hutchison-and-goto-launch-sahabat-ai-indonesias-open-source-llm-for-empowering-digital-sovereignty

153. Foreign Ministry to Utilize AI-Based Services for Indonesian Citizens Abroad, accessed May 9, 2025, https://en.tempo.co/read/1975389/foreign-ministry-to-utilize-ai-based-services-for-indonesian-citizens-abroad

154. arXiv:2501.11499v1 [cs.IR] 20 Jan 2025, accessed May 9, 2025, https://arxiv.org/pdf/2501.11499

155. ML and NLP Research Highlights of 2021 - ruder.io, accessed May 9, 2025, https://www.ruder.io/ml-highlights-2021/

156. Publications - Cornell NLP, accessed May 9, 2025, https://nlp.cornell.edu/pubs/

157. www.itm-conferences.org, accessed May 9, 2025, https://www.itm-conferences.org/articles/itmconf/pdf/2025/05/itmconf_iccp-ci2024_01017.pdf

158. Recent Trends in Deep Learning Based Natural Language Processing - arXiv, accessed May 9, 2025, http://arxiv.org/pdf/1708.02709

159. Deep Learning for Natural Language Processing - Prof. Dr. Bela Gipp, University of Göttingen, GippLab, accessed May 9, 2025, https://gipplab.org/deep-learning-for-natural-language-processing/

160. A Survey of the Usages of Deep Learning for Natural Language Processing - arXiv, accessed May 9, 2025, https://arxiv.org/pdf/1807.10854