Overview of the Analytics-Based Triage of Temporary Resident Visa Applications

Motivation

IRCC is testing new and innovative approaches to better serve our clients. As more and more people apply for IRCC programs, we are exploring technologies to help us process applications more efficiently by automating certain simple tasks and activities so that decision-makers can focus on more complex applications and issues. These technologies include computer analytics that recognize patterns to help accelerate our work and better inform decision makers. Ultimately, these technologies will help some clients to receive their decision sooner.

Our employees remain central to IRCC's decision making processes. The technology is there to support, assist and inform IRCC decision makers – not replace them.

Current Projects

As of January 28, 2020, IRCC operates three analytics-based systems that are triaging portions of the daily intake of temporary resident visa (TRV) applications:

- A system for TRVs received online from China, which was launched in April 2018.
- A system for TRVs received online from India, which was launched in August 2018.
- A system for TRVs received from India through a Visa Application Centre (VAC), which was launched in January 2020.

These systems are designed to operate in the same way, as described below, although the third system had not yet been fully implemented as of January 28, 2020 (details below). The diagram on page 2 illustrates the process flow.

1. Based on rules developed by experienced officers ("officer rules"), a first group of complex cases is triaged directly to officers for decision according to regular procedures, without any processing by an analytics model. The officer rules identify applications from clients with characteristics known to entail a higher likelihood of ineligibility or inadmissibility (e.g. a past criminal conviction), or requiring additional supporting documents (e.g. a consent letter for a child traveling alone). The officer rules embody local expertise and best practices which existed prior to the creation of the analytics models.

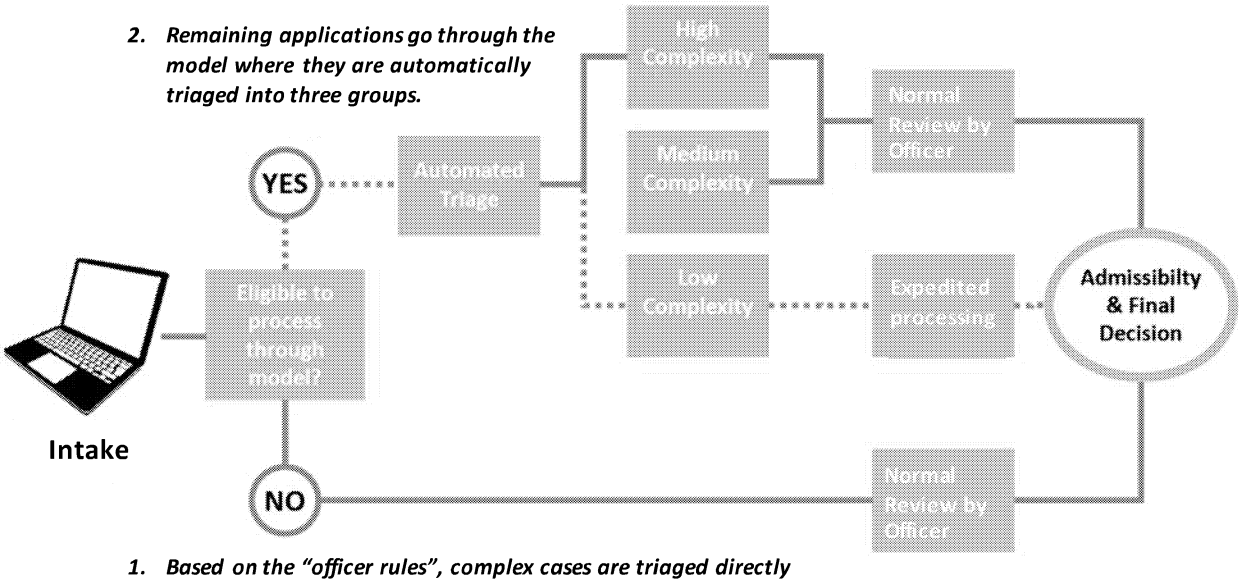
2. Of the remaining intake, a computer model triages applications into three tiers using rules developed with the assistance of machine learning algorithms and IRCC officials. These rules are extensively tested and reviewed by IRCC officials before being implemented. No components of the system, including the rules, change without human oversight, testing and approval.

    - Tier 1 includes the simplest applications for which eligibility is approved by the system based solely on the model's recommendation, without review by officers. These are the most straightforward and low risk cases, such as a returning trusted client who has an

established history. Prior to any final approval of the visa, officers determine if the client poses any admissibility concerns. Applications requiring an extended admissibility assessment are removed from the Tier 1 group and routed to an officer for regular processing and decision. As of January 28, 2020, the third system, which triages TRVs received from India through a VAC, was not fully implemented. As a result, the system is not yet issuing eligibility approvals for Tier 1 files. Officers continue to determine both eligibility and admissibility for all files triaged into Tier 1 for this caseload.

- Tier 2 contains medium complexity applications, which are assigned to officers for regular manual processing and decision, for both eligibility and admissibility. The model makes no approval or recommendation on these applications.

- Tier 3 contains higher complexity applications, which are assigned to officers for regular manual processing and decision, for both eligibility and admissibility. The model makes no approval or recommendation on these applications.



Three key points are worth emphasizing:

- These analytics systems accelerate the eligibility approval of straightforward cases. They never refuse applications or recommend refusing applications.

- Protecting the safety and security of Canadians remains a top priority. Officers continue to perform the admissibility assessments on all applications.

- As a result, there is human review on all applications. The decision-making process is only partly automated. The final decision is never made by the system.

Quality Assurance

One of the quality assurance measures implemented to monitor the system consists in having officers review a random sample of Tier 1 applications (10%) each day to determine the eligibility and admissibility of the applicant. This is a "blind" quality assurance, meaning that officers are not informed that those applications had been selected for eligibility approval by the model. Officer decisions on this sample are constantly monitored to ensure that we obtain 99% concurrence between officers and the model's assessment to approve eligibility (i.e. officers approve at least 99% of these applications). So far, for the projects as a whole, we have consistently met our 99% standard. Since officers are still determining both eligibility and admissibility for Tier 1 files received from India through a VAC, this quality assurance has not been implemented yet for this caseload.

Additional quality assurance and monitoring measures include:

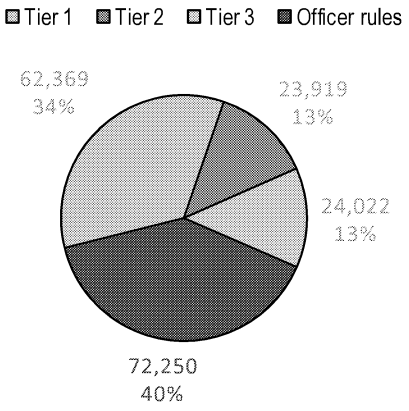
- Daily monitoring of the volume of applications being triaged to each tier to ensure the triage is functioning as expected and is not disrupted or altered by outages of IRCC's IT systems.
- Periodic monitoring of the trends in these indicators over longer periods to assess whether there is need to update the model rules (i.e. retrain the model).
- Periodic monitoring of trends in adverse behaviour when clients visit Canada (e.g. do they abide by the terms of their visa?)

We continue to carefully monitor the outcomes of these systems as we evaluate whether to expand to other countries and uses.

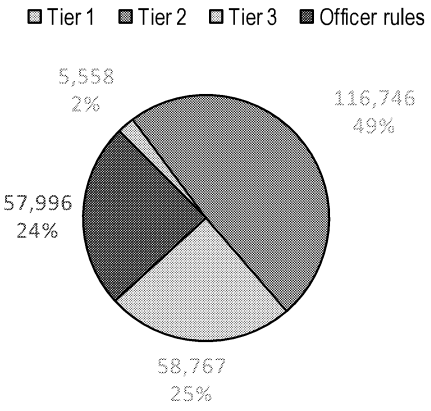
Statistics on the Triage

The charts below show how many applications were triaged into each tier and by the officer rules, from the launch date of each system up to January 28, 2020 (see launch dates on page 1).

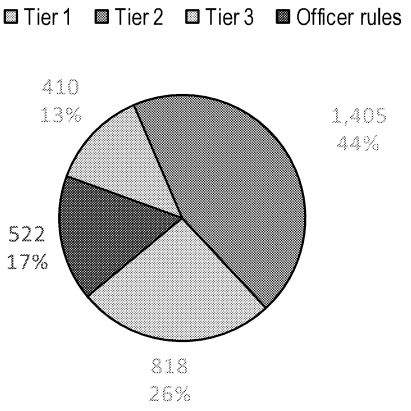
Received Online from China



Received Online from India



Received from an India VAC



The table below shows the percentage of applications that were approved in each tier and among the officer rules for each system. Some key observations:

- Despite the quality assurance results discussed above, the approval rate for Tier 1 is not 99%. Most notably, some clients who apply online and are approved never mail their passport to IRCC for the printing of the visa counterfoil. They are eventually refused by an officer for non-compliance.

- The instructions presented in the Annex clearly direct officers to perform a complete review and reach their own decision for applications triaged into Tier 2, Tier 3 or by the officer rules. Officers must never let the triage result determine their decision, regardless of the statistics below.

- Due to significant differences between China and India with respect to the social, economic and political environments, it would be imprudent to compare the numbers across countries.

Percent of Applications Approved
from Each System's Launch Date to January 28, 2020

	China Online	India Online	India VAC
Tier 1	97%	97%	96%
Tier 2	86%	63%	37%
Tier 3	43%	13%	5%
Officer rules	66%	53%	56%
Total	**76%**	**49%**	**38%**

Accountability

Prior to the launch of these systems, officers reviewed and validated each of the officer rules and the model rules leading to applications being triaged into Tier 1. Additionally, these rules are formally approved by a Director General prior to any system being placed in service. Once approved by this Director General, he or she is the decision maker for all eligibility approvals issued by these systems. This ensures that accountability is clearly defined and rests with a human being.

In order to protect the integrity of Canada's immigration programs, the rules contained in the computer systems cannot be disclosed. Should they be requested under the *Access to Information Act* (ATIA), they would be exempted from disclosure pursuant to Section 16 of the ATIA.

Instructions were prepared for officers who work with these systems to ensure that they understand their responsibilities and so that processing is performed consistently and fairly. The Annex contains the instructions prepared for decision makers.

Protecting personal information

The use of personal information for analytics-based processing is in accordance with the *Immigration and Refugee Protection Act* and its use is consistent with the purpose for which it was initially collected.

- The computer analytics systems use the personal information collected by IRCC as part of the application process, along with historical application information and information provided by our law enforcement partners in accordance with formal information sharing agreements. They never use information from social media.

- IRCC's use of computer analytics underwent a full Privacy Impact Assessment which is updated when changes are made to the systems. Privacy will remain a central priority should IRCC expand the use of computer analytics. IRCC continues to take its privacy obligations regarding personal information seriously and continues to follow and respect Canada's *Privacy Act* and related Treasury Board directives and policies.

Developing the technology responsibly

- Decision makers are involved throughout the process of developing and using computer analytics systems and are responsible for actions they take while using these systems.

- Before we explore any kind of technology to support one of our services, we assess the needs specific to that service, including the benefits for and impact on clients. Each new computer analytics system goes through rigorous review, as well as testing on thousands of applications. Only the most robust and reliable systems are implemented.

- When a model is developed, the data is reviewed for quality, completeness and representativity of the client population. Applications that are missing critical information or for which the data is of lesser quality are excluded from the machine learning process to ensure that the resulting model is accurate and undistorted. The models for China and India are built based on recent applications received from those countries to ensure that the model rules are representative and reflective of recent trends.

- In 2018, prior to the launch of its first system, IRCC asked the National Research Council of Canada to conduct an expert assessment of its methodology. They concluded that:

> *"The methodology of the initiative is excellent and follows the steps necessary for the success of a machine learning project. The initiative is very well adapted to the various organizational risks (legal, public perception, security) while maximizing performance measures, i.e. transparency of methodology, efficiency of operations and data quality."*

- If a client is unsatisfied with a decision they receive, they still have the same recourse mechanisms as prior to the introduction of these systems.

- To support the responsible use of data-driven technologies, IRCC has been engaging with a range of internal and external subject matter experts to analyze the full spectrum of legal, ethical, technological and operational considerations. IRCC officials have presented the Department's work at numerous domestic and international conferences. In April 2019, IRCC organized the Symposium on Algorithmic Government in Ottawa to engage with stakeholders and raise awareness about ethical approaches to applying artificial intelligence in government.

- Through a combination of research, engagement and practical experience, the Department has developed detailed policy guidance for the responsible use of computer analytics in the immigration domain. All of the Department's projects adhere to a set of guiding principles pertaining to transparency, privacy, procedural fairness and accountability.

- IRCC has a reputation as a leader in the Government of Canada when it comes to the responsible use of data-driven technologies. Our department contributed to the development of the Government of Canada's new Directive on Automated Decision-making and associated Algorithmic Impact Assessment tool, and IRCC is prepared to demonstrate full compliance with the Directive once it comes into force.