

Chatbot for Complementarity Assessment Framework (COMPASS)

DSI 39
Lin Li Cheng

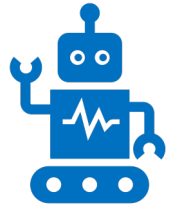
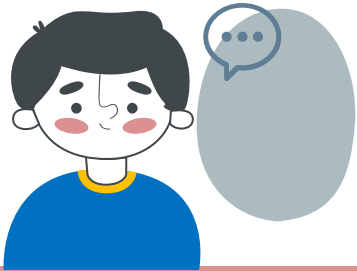



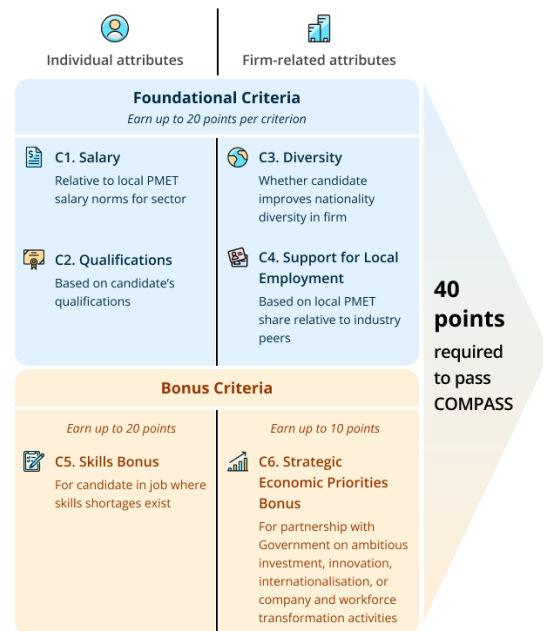


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What is Complementarity Assessment Framework (COMPASS)?

- COMPASS is a new points-based framework that was announced in Mar 2022 for Employment Pass (EP) approvals
- COMPASS considers both individual and firm-related attributes to holistically evaluate an EP applicant's complementarity
- To qualify for EP:
 - applicants must meet the minimum EP qualifying salary; and
 - score at least 40 points under COMPASS



Sources:

<https://www.straitstimes.com/singapore/from-the-gallerynew-points-system-a-compass-for-better-workforce-complementarity>

<https://www.mom.gov.sg/newsroom/speeches/2022/0304-speech-by-minister-for-manpower-dr-tan-see-leng-at-committee-of-supply-2022>

Ongoing updates and media coverage on COMPASS to prepare businesses for the new requirement

Background-screening firms expect rising demand with new EP rules



There are currently eight background-screening companies whose verification services are recognised by MOM. PHOTO: ST FILE

*"Demand for background-screening services, especially to **verify educational qualifications**, is likely to see a jump when new rules for Employment Pass (EP) applicants take effect in September, industry players said."* – UPDATED 22 APR 2023, 6:34 AM SGT

Sources:

<https://www.straitstimes.com/business/background-screening-companies-expect-rising-demand-for-services-with-new-ep-rules>

<https://www.straitstimes.com/business/27-job-types-get-bonus-points-for-employment-pass-approvals>

AI scientists, nurses among 27 occupations that will get bonus points for employment pass approvals



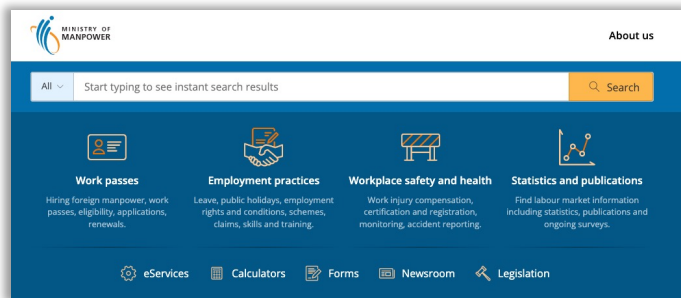
Under the two new criteria, applicants who possess skills that are in shortage here, and firms that contribute to Singapore's strategic economic priorities, will be able to get bonus points for an employment pass. PHOTO: JASON GUN

*"**Two new bonus criteria were announced** on Friday... The two criteria allow applicants who possess skills that are in shortage here, and firms that contribute to Singapore's strategic economic priorities, to earn bonus points to help secure an EP."* – UPDATED 21 APR 2023, 2:51 PM SGT

Existing channels to get information about COMPASS have their limitations

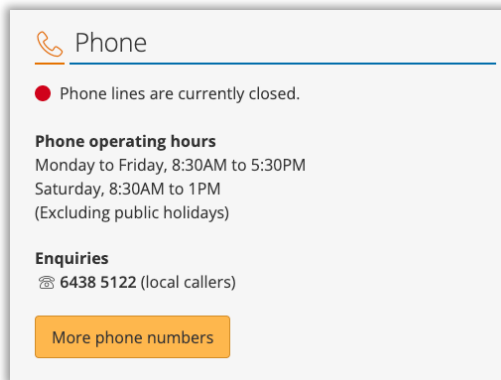
Website

- Pro:** Contains updated information
Con: Requires user to navigate around to find the content



Hotline

- Pro:** Immediate assistance
Con: Operating hours are not 24/7



Feedback form

- Pro:** Information is comprehensive
Con: Not real-time

A screenshot of the 'Feedback form' page. The title is 'Feedback form'. Below it, a paragraph states: 'You can send feedback or enquiries about work passes, employment practices, workplace safety and health and general feedback.' A note indicates that an asterisk (*) refers to mandatory fields. The form has a single question: '1 What do you want to give feedback or enquire on?'. There are five radio button options: 'Work passes', 'Employment practices', 'Workplace safety and health', 'Employment agencies', 'Foreign workforce management', and 'General Feedback'. At the bottom, there is a 'Continue' button and a page indicator '1 of 4'.

Readily available chatbots are not so helpful

- Without including more context or providing the chatbot with a specific knowledge base, the answers generated would typically be based off some assumed context, which is incorrect

Bard

Issue: Wrong context
Provided information about Australia's Skilled Migration Points System

How much should my candidate from Healthcare be earning to be awarded 20 points?

The specific amount of income required for a candidate from the Healthcare sector to receive 20 points will depend on the specific assessment criteria being used. However, in general, candidates from this sector can expect to receive more points for higher incomes. This is because higher incomes are typically associated with more experience, skills, and responsibility.

For example, under the Australian Skilled Migration Points System, candidates from the Healthcare sector can receive up to 15 points for income. The amount of points awarded is based on the candidate's annual salary, with higher salaries receiving more points. Specifically, candidates who earn between AUD 53,900 and AUD 86,900 per year will receive 5 points, while those who earn AUD 86,900 or more per year will receive 15 points.

It is important to note that income is just one factor that is considered when assessing a candidate's eligibility for skilled migration. Other factors include qualifications, experience, English language skills, and age.

Here is a table that summarizes the points awarded for income under the Australian Skilled Migration Points System for candidates from the Healthcare sector:

Annual Salary	Points Awarded
AUD 53,900 - AUD 86,899	5
AUD 86,900 or more	15

Export to Sheets

As you can see, candidates from the Healthcare sector who earn a higher salary will be more likely to receive a higher score on their skilled migration points test. This is because higher incomes are typically seen as an indication of a candidate's skills, experience, and potential to contribute to the Australian economy.

ChatGPT 3.5

Issue: Wrong context
Provided information about Canada's Express Entry system

How much should my candidate from Healthcare be earning to be awarded 20 points?

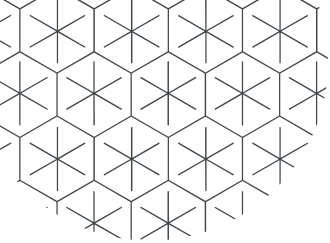
As of my last knowledge update in January 2022, there is no specific category or factor in the Express Entry system for earning 20 points based on a candidate's income in the field of Healthcare or any other occupation. The points awarded in the Express Entry system are primarily based on a candidate's Comprehensive Ranking System (CRS) score, which takes into account various factors, including age, education, work experience, language proficiency, and more.

To increase a candidate's CRS score, they can focus on improving their qualifications in the following ways:

1. Improve Language Proficiency: Candidates can earn additional points by achieving higher language proficiency test scores in English and/or French.
2. Gain More Work Experience: Accumulating more years of work experience in the healthcare field may increase the candidate's CRS score.
3. Obtain Additional Education: Earning a higher level of education or obtaining Canadian educational credentials can lead to more CRS points.
4. Secure a Job Offer: Having a valid job offer in Canada can provide additional CRS points.
5. Enhance Adaptability Factors: Points can also be earned for factors like having a sibling in Canada or having previous work or study experience in Canada.

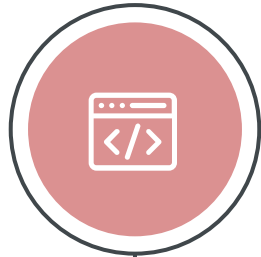
While income is not a direct factor for earning points in the Express Entry system, it can indirectly play a role in securing a valid job offer in Canada, which, in turn, may increase a candidate's CRS score. The specific income required for a job offer depends on the occupation and location, and it should meet the prevailing wage standards in Canada.

It's essential to keep in mind that the Express Entry system and its points allocation criteria can change over time. Therefore, it's advisable to consult the official website of Immigration, Refugees, and Citizenship Canada (IRCC) for the most up-to-date information and to consider seeking guidance from an immigration professional for personalized advice.



Objective:
**To create a customised chatbot
that addresses queries from
businesses about COMPASS,
which is user-friendly and
offers 24/7 support**

Workflow of building a customised chatbot



Data collection

- Scraping relevant URLs from MOM website
- Storing relevant HTMLs and PDFs



Chatbot creation

- Customising chatbot's responses with collected data

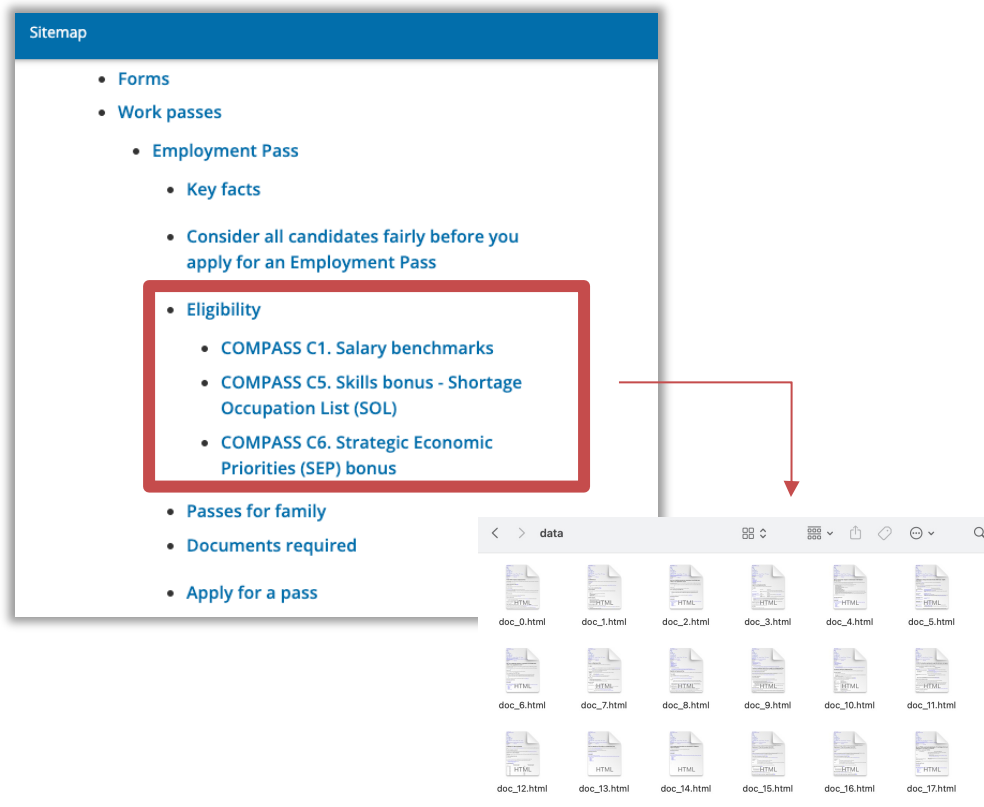


Deployment

- Deploying the customised chatbot for businesses

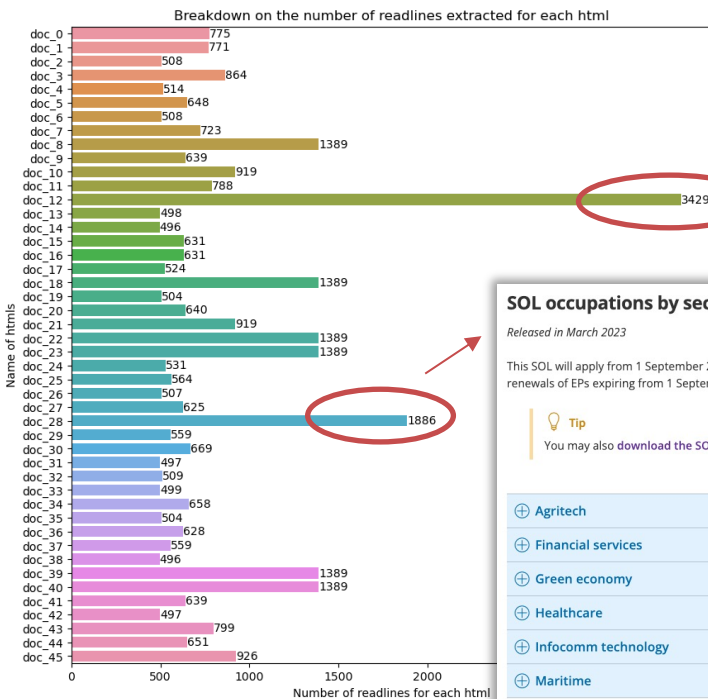
Scraped data from the main URLs and all relevant URLs present in the main URLs as our knowledge base

- The sitemap of MOM website shows a hierarchy of content available
- We narrowed down to the Eligibility segment which included the COMPASS criteria
- Using python package and libraries, we extract all the relevant URLs, and subsequently store these documents into a folder as our knowledge base for the chatbot



HTMLs files covering sectorial information for C1. Salary and C5. Skills Bonus were significantly longer

- COMPASS criteria for salary and skills bonus could be overwhelming for readers



C1 salary benchmarks by sector

Released in May 2023

They will apply from 1 September 2023 to all new EP applications and to renewals of EPs expiring from 1 September 2024.

The required **fixed monthly salary** for candidates increases progressively with age (increases from age 23 to age 45).

Tip

- Check your organisation's sector classification online
- Download the C1. Salary benchmarks

Accommodation

Administrative & Support

Air & Sea Transport

Arts, Entertainment & Recreation

Banking & Other Financial Services Activities n.e.c.

Construction

SOL occupations by sector

Released in March 2023

This SOL will apply from 1 September 2023 to all new EP applications and renewals of EPs expiring from 1 September 2024.

Tip

You may also download the SOL guidebook

AgriTech

Financial services







Green economy

Healthcare

Infocomm technology

Maritime

Reference table on COMPASS

Individual attributes		Firm-related attributes	
Foundational Criteria			
Earn up to 20 points per criterion			
 C1. Salary Relative to local PMET salary norms for sector	 C3. Diversity Whether candidate improves nationality diversity in firm	40 points required to pass COMPASS	
 C2. Qualifications Based on candidate's qualifications	 C4. Support for Local Employment Based on local PMET share relative to industry peers		
Bonus Criteria			
Earn up to 20 points		Earn up to 10 points	
 C5. Skills Bonus For candidate in job where skills shortages exist	 C6. Strategic Economic Priorities Bonus For partnership with Government on ambitious investment, innovation, internationalisation, or company and workforce transformation activities		

Overview of creating a customised chatbot

1

Generate an OpenAI API key

2

Read in the documents that forms the knowledge base for the chatbot

3

Indicate the Large Language model (e.g., gpt-3.5-turbo) to use, the type of embedding model (e.g., text-embedding-ada-002), and any specific instructions for the chatbot (i.e., system prompt)

4

Start your query and refine step 3 to get the desired responses

The chatbot with system prompt provides more context in its responses and is preferred

1

Original (GPT-3.5-Turbo)



How much should my candidate from Healthcare be earning to be awarded 20 points?



Your candidate from Healthcare should be earning \$17,894 to be awarded 20 points.

Health & Social Services

Age	Required salary for 10 points (65th percentile of local PMETs)	Required salary for 20 points (90th percentile of local PMETs)
40	\$ 7,840	\$ 16,697
41	\$ 8,009	\$ 17,295
42	\$ 8,177	\$ 17,894
43	\$ 8,345	\$ 18,492
44	\$ 8,513	\$ 19,091
≥45	\$ 8,681	\$ 19,689



2

Improved with system prompt (GPT-3.5-Turbo)



How much should my candidate from Healthcare be earning to be awarded 20 points?

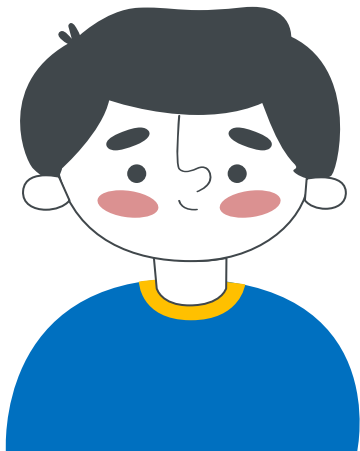


Based on the provided context information, a candidate from the Healthcare sector who is 40 years old should be earning a salary of \$16,697 to be awarded 20 points.

Query engine	RAGAS Score	Answer Relevancy	Faithfulness
Original (GPT-3.5-Turbo)	0.8767	0.9227	0.8350
Improved with system prompt (GPT-3.5-Turbo)	0.8310	0.9606	0.7322

For all the metrics, the closer the value to 1, the better the performance.

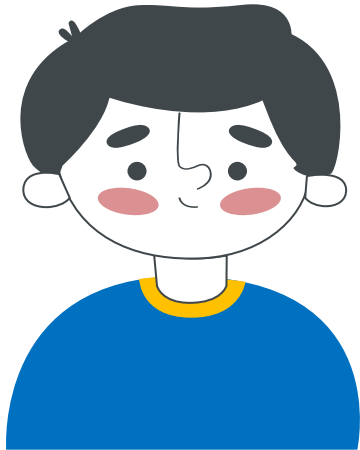
Persona for demo



Meet Tom

- **HR representative** of a manufacturing firm, i.e, The Colony Pte. Ltd
- **Replacement staff** of an ex-employee who left without notice
- **Unfamiliar of the requirements** for employment pass holders

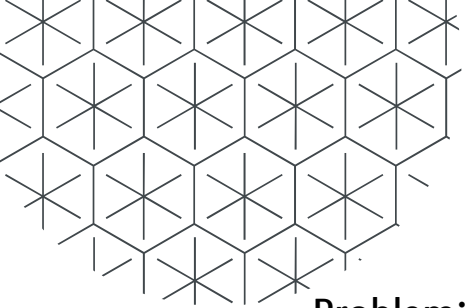
Questions Tom would like to find out



- 1) I have a candidate from Fudan University, will she earn 20 points under the qualification criterion?
- 2) I have another candidate from Flinders University, will he earn 20 points under the qualification criterion?
- 3) My candidate is 35 years old and we are from manufacturing sector, what is the minimum salary to get 20 points?
- 4) What is support for local employment about?



<https://chatbot-compass.streamlit.app>



Summary

Problem:

While there are various channels that businesses can rely on to get information about COMPASS, there has not been any that could provide 24/7 support and immediate assistance for the queries that businesses might have when planning for the applications and/or renewals of Employment Passes.

Deliverable:

To create a customised chatbot that addresses queries from businesses about COMPASS, which is user-friendly and offers 24/7 support

Next steps

Phase 1

Improvise the chatbot to achieve RAGAS score > 0.9

- Iterating the system prompts, exploring various LLMs and embedding models

Phase 2

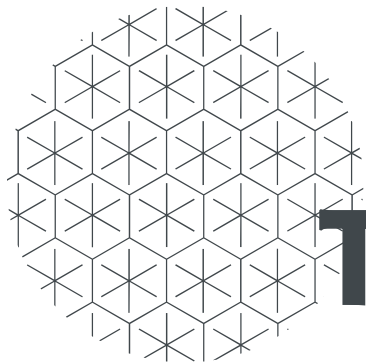
Piloting the improvised chatbot to gather feedback from users and refine accordingly

- Using MOM's official Telegram channel (/sgministryofmanpower) to reach out to a smaller pool of users

Phase 3

Deploy the refined chatbot on MOM website for any users to enquire about COMPASS

- Expanding the use of the refined chatbot to reach out to all visitors of MOM website



Thank you