Information technology has significantly changed how information is communicated across the globe. Thanks to the use of emails, social media and shared databases, the world now seems to be a much smaller place. Yet the issue of language barrier still remains, hindering effective communication between people if the information is presented in a language the recipient does not understand. This deficiency calls for a technological solution, a solution that can remove this language barrier for those who do not share a common tongue. Machine translation (MT) is the automated process in which texts (or speeches) are translated by computer software from one language (the source language, e.g. English) to another (the target language, e.g. Chinese). MT was initiated by computer scientists decades ago, but it is a relatively new concept for the general public. Early MT software adopted dictionary-based methods, using entries in a language dictionary to find equivalents in the target language before applying grammatical rules to the translated words. A key issue with this type of MT is that a single word can have multiple meanings (polysemy), and finding the most appropriate equivalent in the target language can be problematic. Furthermore, if the two languages are not close, the dissimilarity in grammar can present significant challenges for accurate translation. Current MT methods are more advanced, benefiting from increasingly powerful computers and larger databases. Statistical Machine Translation (SMT) is the most common MT method today. As the name suggests, this method uses statistical models (such as Bayes) and vast amounts of language data to find the most probable translation based on the relative frequency of how a given phrase in the source language has been translated into the target language. In this way, SMT essentially ‘guesses’ the most likely translation to address the issue of polysemy. A more sophisticated but less common method is Neural Machine Translation (NMT), which imitates the thought process of human translators and builds an artificial neural network to ‘learn’ how to translate. NMT can improve its performance over time. Examples of current NMT software include Google Translate, WeChat Translate and DeepL. Machine translation is fast and inexpensive, offering clear benefits to individuals and businesses who cannot or do not wish to use human translators. MT engines can process millions of words per hour and produce reasonably accurate, usable translations in nearly any language. It is often perceived as the cost-effective option that can also provide the added benefit of saving time. For instance, a user can simply type or copy a text into an online translation tool, such as aforementioned Google Translate, and the translation will be produced within seconds or minutes, depending on the length of the text. In addition, Google Translate, like many other MT software, offers its service free of charge. This is clearly an advantage of MT over human translators. One other benefit of MT is easy accessibility. Translation can be done anywhere and at any time on portable devices, such as smartphones and laptops. In 2020, a survey of over 2,800 small and medium enterprises (SMEs) published by the European Commission revealed that while an overwhelming majority of SMEs still preferred human translation for business activities, such as negotiating contracts and dealing with the public sector in another country, over 70% said MT was nonetheless useful for their businesses. When deciding whether or not to use MT, the most important factor for SMEs was accuracy, followed by ease of use, cost and speed. The majority of SMEs regarded social media (80%), gathering information (70%) and chatbots (60%) to be the main uses of MT.

Machine translation is also a good choice in situations where having the materials translated by a human translator would take too much time. For example, MT can be used to translate PowerPoint presentations, intranet bulletins and other similar documents, particularly when the need to translate these documents is urgent. Some believe that the quality of machine translation is invariably inferior to that of human translation. Converting text from a source language (e.g. Chinese) to a target language (e.g. English) is complex and intricate because a number of variables have to be considered during the process, such as vocabulary, sentence structure, style, fluency and cultural context. Translating any of these elements incorrectly can produce a translation that is unfit for purpose, causing misunderstanding and failing to fulfil one of the most important aims of translation: retaining the meaning and integrity of the original text. It has been claimed that MT is able to produce translations that are reasonably accurate at times. Google Translate can be over 90% accurate when translating between English and Spanish. The accuracy rates drop only slightly, ranging between 80 to 90%, for languages such as Chinese, Korean and Tagalog. However, Google Translate performs significantly less well with certain languages such as Farsi (67% accuracy) and Armenian (55% accuracy). MT often produces translations that are adequately comprehensible but may be unnatural or robotic. Some MT software adopt the ‘literal translation’ method, translating text word-for-word. This is particularly a problem if there are considerable grammatical differences between the two languages (such as Chinese and English). The translation may contain numerous errors due to problematic sentence structure and mistranslation of words and phrases. It can be a serious issue, particularly for businesses that generally require high quality translation for their marketing and public relation purposes. Poor translation can indeed increase the risk of significant reputational damage, leading to loss of revenue and clients. Human translators are usually fluent in both the source and target languages. Good translators also understand the nuances and subtleties of both languages and consider the linguistic and cultural differences between the two languages while translating. Moreover, many human translators possess sufficient knowledge of certain fields (such as mathematics and computer science). Their professional expertise (and ‘domain knowledge’) can deliver high-level accuracy and sophistication that are required for important, professional documents.

The 2020 European Commission survey reported that most respondents preferred human translation in formal situations, for example, when negotiating and signing contracts, resolving conflicts around commercial transactions, dealing with the public sector abroad and conducting marketing and promotional activities. It is believed that in these important situations, human translators are more suitable as they are more ‘trustworthy’, resourceful and adaptable than machine translation. This assumption seems reasonable, considering that less sophisticated MT software often leave words or phrases untranslated if they cannot find equivalents in the target language. The main issue with human translation is the time it can take to produce an accurate translation, particularly when compared with the fast speed of its machine-based counterpart. Speed may be crucial in the age of information explosion. The impact of the abundance of information in our time suggests that it is indeed challenging for humans to deal with this excess of information, let alone to process and translate all that information. This ‘overload’ of information can, however, provide opportunities for Machine Translation software to improve themselves as they can exploit the huge amount of data available to enhance their performance to rival experienced human translators. Other MT exists that is similar to AI, which can deal with the ever-expanding databases built on former translations, while a phrase-based translation program can develop its skills by trial and error using powerful processors. The question is: how good can MT be?

信息技术已经大大改变了全球范围内的信息交流方式。由于电子邮件、社交媒体和共享数据库的使用，现在的世界似乎小了很多。然而，语言障碍的问题仍然存在，如果信息是以接收者不懂的语言呈现，就会阻碍人们之间的有效沟通。这种缺陷需要一个技术解决方案，一个能够为那些没有共同语言的人消除这种语言障碍的解决方案。机器翻译（MT）是一个自动化过程，通过计算机软件将文本（或讲话）从一种语言（源语言，如英语）翻译成另一种语言（目标语言，如中文）。MT是几十年前由计算机科学家发起的，但对于普通人来说，它是一个相对较新的概念。早期的MT软件采用了基于字典的方法，利用语言字典中的词条来寻找目标语言中的对应词，然后再将语法规则应用于翻译的单词。这种类型的MT的一个关键问题是，一个词可以有多种含义（多义词），在目标语言中找到最合适的对应词可能是个问题。此外，如果两种语言不相近，语法上的差异会给准确翻译带来重大挑战。目前的MT方法比较先进，得益于日益强大的计算机和更大的数据库。统计机器翻译（SMT）是当今最常见的MT方法。顾名思义，这种方法使用统计模型（如贝叶斯）和大量的语言数据，根据源语言中的特定短语如何被翻译成目标语言的相对频率，找到最可能的翻译。通过这种方式，SMT基本上是 "猜测 "最可能的翻译，以解决多义词的问题。一种更复杂但不太常见的方法是神经机器翻译（NMT），它模仿人类翻译者的思维过程，建立一个人工神经网络来 "学习 "如何翻译。NMT可以随着时间的推移提高其性能。目前NMT软件的例子包括谷歌翻译、微信翻译和DeepL。机器翻译速度快、成本低，为不能或不愿使用人工翻译的个人和企业提供了明显的好处。MT引擎可以每小时处理数百万字，并在几乎任何语言中产生合理准确、可用的翻译。它通常被认为是具有成本效益的选择，还可以提供节省时间的额外好处。例如，用户可以简单地将文本输入或复制到一个在线翻译工具中，如前面提到的谷歌翻译，翻译将在几秒钟或几分钟内产生，这取决于文本的长度。此外，谷歌翻译，像许多其他MT软件一样，免费提供服务。这显然是MT比人工翻译的一个优势。MT的另一个好处是容易获得。翻译可以在任何地方、任何时间通过智能手机和笔记本电脑等便携设备完成。2020年，欧盟委员会公布的一项针对2800多家中小企业的调查显示，虽然绝大多数中小企业在商业活动中仍然倾向于人工翻译，如谈判合同和与另一个国家的公共部门打交道，但超过70％的人表示，MT对他们的业务还是很有用的。在决定是否使用MT时，中小企业最重要的因素是准确性，其次是易用性、成本和速度。大多数中小企业认为社交媒体（80%）、收集信息（70%）和聊天机器人（60%）是MT的主要用途。

在由人工翻译材料会花费太多时间的情况下，机器翻译也是一个不错的选择。例如，MT可用于翻译PowerPoint演示文稿、内部网公告和其他类似文件，特别是在急需翻译这些文件的时候。有些人认为，机器翻译的质量无一例外地不如人工翻译。将文本从源语言（如中文）转换为目标语言（如英语）是复杂和错综复杂的，因为在这个过程中必须考虑许多变量，如词汇、句子结构、风格、流畅性和文化背景。翻译这些元素中的任何一个不正确，都会产生不适合的翻译，造成误解，无法实现翻译最重要的目标之一：保留原文的意义和完整性。有人声称，MT能够产生合理准确的翻译，有时也是如此。谷歌翻译在英语和西班牙语之间进行翻译时，准确率可以超过90%。对于中文、韩文和他加禄语等语言，准确率仅略有下降，在80至90%之间。然而，谷歌翻译对某些语言的表现明显较差，如波斯语（准确率67%）和亚美尼亚语（准确率55%）。医学翻译经常产生充分理解的译文，但可能是不自然的或机器人式的。一些MT软件采用 "直译 "的方法，逐字逐句地翻译文本。如果两种语言之间存在相当大的语法差异（如中文和英文），这尤其是一个问题。由于有问题的句子结构和单词和短语的误译，翻译可能包含许多错误。这可能是一个严重的问题，特别是对于那些一般需要高质量的翻译来实现其营销和公共关系目的的企业。不良的翻译确实会增加重大声誉损害的风险，导致收入和客户的损失。人工翻译通常在源语言和目标语言方面都很流利。好的译员还了解两种语言的细微差别和微妙之处，并在翻译时考虑两种语言的语言和文化差异。此外，许多人类译者拥有某些领域（如数学和计算机科学）的足够知识。他们的专业知识（和 "领域知识"）可以提供重要的专业文件所需的高水平准确性和复杂性。

2020年欧盟委员会的调查报告称，大多数受访者在正式场合更喜欢人工翻译，例如，在谈判和签署合同、解决围绕商业交易的冲突、与国外公共部门打交道以及开展营销和推广活动时。人们认为，在这些重要场合，人工翻译更适合，因为他们比机器翻译更 "值得信赖"，更有资源，更有适应性。考虑到不太成熟的MT软件如果在目标语言中找不到对应的词或短语，往往会留下不翻译，这种假设似乎很合理。人工翻译的主要问题是产生准确翻译所需的时间，特别是与机器翻译的快速速度相比。在信息爆炸的时代，速度可能是至关重要的。我们这个时代的大量信息的影响表明，人类要处理这种过量的信息确实是一种挑战，更不用说处理和翻译所有这些信息了。然而，这种信息的 "超载 "可以为机器翻译软件提供改进自己的机会，因为它们可以利用现有的大量数据来提高自己的性能，与有经验的人类译员相媲美。其他MT的存在类似于人工智能，可以处理建立在前人翻译上的不断扩大的数据库，而基于短语的翻译程序可以通过使用强大的处理器进行试验和错误来发展其技能。问题是：MT能有多好？