



Harmonizing Tradition and Technology: A Review of Tarannum and Its Prospects in Computing Research


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Article Info	ABSTRACT
<p>Article history:</p> <p>Received: 30 Februari 2023 Revised: 13 March 2023 Accepted: 25 March 2023 Published: 1 April 2023</p>	<p>Muslims consider the art of tarannum al-Quran a significant and valuable tradition that enhances the Quran's divine status. Tarannum involves reciting the Quranic verses melodically and rhythmically and is viewed as a spiritual act of worship. This article aims to provide an overview of tarannum, including its various forms and the necessary conditions for Quranic recitation. Tarannum has several types, each with a distinct melody and rhythm, including Bayyati, Hijaz, Soba, Rast, Jiharkah, Sikah, and Nahawand. Each style is used for specific Quranic verses, such as Bayyati for Surah Al-Fatiha and Hijaz for Surah Al-Fil. Adherence to specific conditions is crucial to performing tarannum, including correct Arabic letter pronunciation and elongation, modulation, and intonation of the voice. Additionally, understanding the Quranic verses' meanings is vital to convey the intended message effectively. In summary, tarannum plays an essential role in the Islamic faith, elevating the beauty and spirituality of Quranic recitation. This article's overview of tarannum's various forms and necessary conditions for Quranic recitation can benefit those interested in learning this art, preserving this valuable heritage for future generations. In addition, the integration of computing research with tarannum al-Quran offers potential research areas, such as developing digital tools for teaching and learning, using NLP and ML algorithms for analysis, and integrating VR and AR technologies, to preserve and enhance this significant tradition for future generations.</p>
<p>Keywords:</p> <p>Computing Research Tarannum Al-Quran Quran Recitation Quran Song Maqam</p> <p></p>	

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INTRODUCTION

The Holy Quran cannot be rhythmized extemporaneously. The aim of tarannum is not to intone the Quran but it is an art of reading that produces an effect, a consciousness, an awareness of individual reading and listening to it (Said, n.d.). The tarannum of the Quran is a combination of two different concepts, namely the Quran and the art of tarannum. The process of combining these two concepts has produced a form of aesthetic values, intonations, and diversity of sound melodies resulting from the process of toning, pacing and rhythmizing while reading the Quran.

TYPES OF TARANNUM

Maqam, a system of musical modes or scales, is widely employed in many Middle Eastern and North African musical traditions, including tarannum. Each maqam is distinguished by a specific collection of notes, melodic patterns, and rhythmic structures, frequently related to certain moods or emotions. In tarannum, maqams guide the singer's melody and improvisation and establish a specific ambiance or feeling. Each maqam has a distinct character and is typically linked with a specific style or genre of tarannum. For instance, Maqam Bayati is a frequently used maqam in Arabic music, known for its melancholic or introspective mood, while Maqam Rast is often used in Turkish music and is linked with a more upbeat or cheerful mood. Maqams have a significant function in tarannum and are often taught through oral tradition, with students learning by listening to and replicating their instructors. Mastery of diverse maqams is a vital component in becoming a proficient tarannum performer and can necessitate years of practice and study. The following sections will elaborate on the types of Maqams or known as tarannum in Malaysia and several other countries.

Tarannum Bayyati (ترنم بایاتی)

According to Salim (2004), the word Bayyati originates from the Arabic word bayt (بيت) which means 'house'. The word was later used in the form of mubalaghah (مبالغاه) and then added with ya (ي) to become Bayyati (Lembaga Bahasa Dan Ilmu Al-Quran, 1987). Theoretically, it portrays the tarannum as a house that holds some truth and tarannum Bayyati is the foundation of all Quranic recitation arts. This is because Bayyati is the main tarannum style that is used at the beginning and the ending of any Quran recitation (Ismail, 1998). On the other hand, another theory claimed that the word Bayyati comes from the name of one area or district in Iraq. The letter ya'ilah is added to make it similar to the place. This opinion was voiced by Mohd Ali Abu Bakar who actually took the theory into account by Dr. Sayid Hussin al-Munawwar, an Indonesian expert in Quranic art (Lembaga Bahasa Dan Ilmu Al-Quran, 1987). However, these theories of the origin of the term cannot be taken as accurate and true. These theories are only popular among peoples of the Malay Archipelago and not by the majority of the Arab communities.

Tarannum Bayyati has a wide scope to vary and give essence to the recitation of the holy verses in the Quran. The reason is that the Bayyati has twelve melody styles from four levels of intonation, namely, (i) Qarār tone (قرار), (ii) Nawā tone (نوی), (iii) Jawāb tone (جواب), and (iv) Jawāb al-Jawāb tone (جولب الجواب) (Munir, 2005). Apart from that, tarannum Bayyati can be combined with several other melodies that have similar tones to form a variation under Bayyati, which are, (i) Syūri, (ii) Husainiy, (iii) 'Ajām, and (iv) Kurdi (Salim, 2004). Bayyati has unique, soft, melodious, and slow-mode characteristics with a sharp tone. It can be in a high or low pitch and always occurs with a mixture of both. This tarannum style is flexible, easily accepted, and encompasses wide aspects (Ismail, 1998).

Tarannum Hijaz (ترنم حجاز)

The word Hijaz refers to the name of a state in Peninsular Arab. Despite that, there is no specific and detailed information regarding the person or scholar that gives and relates the name of Hijaz to that place. Nevertheless, there is a reliable source that mentioned that this tarannum was originated and developed in Hijaz (Ismail, 1998). Historically, the Hijaz community is narrated as living in a barren, and infertile land of the desert. The tarannum Hijaz was introduced by this community's own qaris. Later, this melody was brought to Egypt and consequently was adapted to suit the tranquil and fertile Nile Valley (Hasri, 2005).

Tarannum Hijaz has a light, fast melody while the rhythm is quite rough, and it is recited in a loud and clear voice. Later, the Hijaz Misri has been changed into a softer and sweeter tarannum so that listeners will be mesmerized by the sweetness of the melody. Besides that, tarannum Hijaz can be combined with other types of tarannum having similar tones. This form a variation that is a part of Hijaz such as (i) Kard, (ii) Kurd, (iii) Kard Kurd, and (iv) Nakriz (Bakar, 1997). There are some characteristics which hold by tarannum Hijaz, for example, (i) slow movement but very effective, (ii) firm and forceful rhyme, (iii) can be suited to any tabaqah of voice, and (iv) more appropriate to be used for verses to order, prevent and reprimand (Bakar, 1997). Finally, the functions of tarannum Hijaz can be described as (i) to lift the presentation of the whole recitation, (ii) to give satisfaction to both qaris and audiences, and (iii) to lead to the firmness of tone and fluency of recitation.

Tarannum Soba (صوب ترنم)

According to the art of Quranic recitation scholars, tarannum Soba originates from an area in Syria. This theory was supported by well-known tarannum expert, Dr. Sayid Agil Husain al-Munawwar. However, there is another scholar that raised the possibility that it originated from Egyptian melodies as it is part of tarannum Bayyati known as Egypt's tarannum Soba (Ismail, 1998). Tarannum Soba comprises five types of intonation harakat and can be combined with three melody variations which are (i) Ajami, (ii) Mahur or Muhur, and (iii) Bastanjar (Munir, 2005).

This tarannum portrays despair and sadness tones which require solution and help. Compared to Bayyati and Hijaz which have fluctuated rhymes, the Soba rhyme is flat, high, and fast. The specialty of tarannum Soba lies in its sweet melodious, rhythmic, and slow beat (Lembaga Bahasa Dan Ilmu Al-Quran, 1987). The attributes of Soba are (i) light and fast reciting, (ii) gentle and melodious rhyme, (iii) suitable for the moderate tabaqah, and (iv) soul-soother (Ismail, 1998). Meanwhile, the roles of tarannum Soba are such as, (i) to calm and release tension, (ii) to make people focus and aware of their mistakes, (iii) suitable for verses that portray happiness, sadness, and comforting, and (iv) to smooth recitation and to be more fluent.

Tarannum Rast (راست ترنم)

There are a few opinions regarding the origin of tarannum Rast. First, Dr. Sayid Agil Husain Munawwar stated that this tarannum style comes from a town named Ras (راس). As it is more accepted in Hijaz, the letter Ta (ت) is added to make it Rast (راست) (Bakar, 1997). The second opinion is from Haji Nik Ja'far Nik Ismail, who stated that the tarannum Rast originated from Persian and has been modified by Egyptian experts of Hijaz recitation following their dialects (lahjah) and cultures. Later, it is made popular to the whole world by the qaris and qariah (Ismail, 1998).

The two aforementioned opinions, however, are in contrast with Dr. Muhsin Salim, another tarannum expert from Jakarta Quranic Institute, claiming that the word Rast (راست) is derived from the Arabic language (هذا) (راست) or (ذا راست) to become the word Rasydah (رشدة) or Rast (Lembaga Bahasa Dan Ilmu Al-Quran, 1987). Tarannum Rast consists of seven types of enunciation harakats and two intonation tabaqats which are Jawab and Jawab al-Jawab. Moreover, tarannum Rast can be combined with three other types of tarannum variation, namely (i) 'Usyaq, (ii) Zanjiran, and (iii) Syabir 'Ala Rast (Munir, 2005). The characteristics of tarannum Rast are (i) light movement, (ii) fast and spirited, (iii) can be adapted with any tabaqah, and (iv) suitable to be used with any style of tarannum. It is mostly used (i) to give an essence to the world of tarannum, (ii) to satisfy the reciter and listeners, (iii) to calm and soothe listener's souls, (iv) to give energy to the tarannum used thereafter, and (v) to give the accurate and fluent pronunciation of letters (Bakar, 1997).

Tarannum Jiharkah (ترنم جهركه)

Similar to the tarannum Rast, tarannum Jiharkah also originates from Persian and was modified by Egyptian experts of the Hijaz Quranic recitation arts to adapt to their cultures. This tarannum was then adopted by qaris and qariahs from all over the world (Ismail, 1998). However, there is another theory that stated that Rast actually originated from the African Continent (Bakar, 1997). Jiharkah has the least number of rhythms and rhymes. In fact, this tarannum depends on the qari whether to recite it slowly or at a fast tempo. Furthermore,

tarannum Jiharkah has only one variation namely Kurdi and it can be recited with two tabaqat intonations, which are Nawa or Jawab and Jawab al-Jawab in four different rhythms (Munir, 2005).

This tarannum has characteristics such as (i) light and fast movement, (ii) effective smoothness, and (iii) suitable for moderate tabaqah (Bakar, 1997). Also, the roles or functions of this tarannum are (i) to release the tenseness in any recitation, (ii) to smoothen the recitation, (iii) to apt for sadness and longing verses, (iv) to give precision in pronouncing any letter, word or verse, and (v) to result in a better concentration and self-awareness.

Tarannum Sikah (ترنم سیکه)

Like the tarannum Jiharkah, tarannum Sikah which means 'strums of guitar' also comes from Persian. This tarannum was modified by Egyptian experts of the Hijaz Quranic recitation arts to adapt to their cultures. This tarannum was made popular by qaris and qariahs to the whole world starting from the 7th until the 19th century (Ismail, 1998). Any qari or qariah who wishes to adopt this tarannum should give full concentration since the soothing and mesmerizing style of this tarannum is hard to be presented perfectly. Tarannum Sikah is made up of six types of rhythmic harakat and two intonations of tobaqat namely Jawab and Jawab al-Jawab.

Tarannum Sikah can be combined with four other variations of melody which are (i) Asli, (ii) Turkiy, (iii) Raml, and (iv) Iraqiy (Lembaga Bahasa Dan Ilmu Al-Quran, 1987). This tarannum has characteristics like (i) a soft movement, (ii) very gentle and sweet, and (iii) suitable for higher note tabaqah. Furthermore, some of the functions of tarannum Sikah are such as (i) to make recitation softer, (ii) to satisfy the reciter and listeners, (iii) more suitable for verses of request, comfort and express hope, and (iv) to become more concentrated and aware.

Tarannum Nahawand (ترنم نه‌اوند)

Tarannum Nahawand derives from the word Nahawand (نه‌اوند) which refers to a place in the Hamadan district of Iran (Persian). This tarannum has been adapted and recomposed to better suit the local Egyptian qaris (Ismail, 1998). Tarannum Nahawand consists of five types of harakat rhythm and two tabaqat intonations namely Jawab and Jawab al-Jawab. Additionally, tarannum Nahawand can be combined with these four variations of melody, (i) Asli, (ii) Nakriz, (iii) Ushaq, and (iv) Murakkab (Munir, 2005). The rhyme of Nahawand is fast, light, soft, and sweet, making it very interesting, fascinating, and enthralling.

Furthermore, a high-pitched voice is required if a qari or qariah wishes to adopt this tarannum in their recitation as it can increase the moderate tabaqat to the highest one and at the same time produces many sound vibrations and good voice control. The characteristics of tarannum Nahawand are (i) light movement, (ii) gentle and touching, and (iii) suitable for moderate tabaqat. Moreover, the effects of tarannum Nahawand in recitation are such as (i) soothing recitation, (ii) results in concentration and self-awareness, (iii) suitable for verses of happiness or sadness, and (iv) fluent pronunciation of letters.

THE CONDITIONS OF THE QURAN SONGS

The songs of the Quran have certain conditions, which distinguished tarannum Al-Quran from other songs. It can be said that tarannum Al-Quran has its features, which can be identified through specific terms. It is different from the other songs, such as qasids, poetry, and so on. The song of the Quran has specific features. These are the features that label the tarannum Al-Quran. The first condition is Harakat. Harakat is an arranged style of electrifying songs from some qith'ah with certain mahatthah. The role of harakat within the song are (i) the First Harakat should be adapted to the last harakat of the song afterward, (ii) the Second Harakat stimuli, inspire and encourage the next harakat, (iii) the Third Harakat is the high harakat or harakat jawab, (iv) the Fourth Harakat is the highest harakat or harakat jawabuljawab, (v) the Fifth Harakat is reduced harakat or harakat inventory, and finally (vi) the Sixth Harakat is harakat cover (Salim, 2004).

The second condition is *Tabaqah*. It is a voice level brought by certain music styles. The human voice has several *tabaqah* or levels, such as (i) the low voice or *qarar*, or chest voice, (ii) the moderate voice, named with *Nawa*, that is the guttural, (iii) the high voice or *Jawab*, or nasal voice, (iv) the highest voice, or *jawabuljawab*, or brain voice, (v) the decreased level voice, or *nuzul*, and lastly (vi) the low voice as the first voice, which is known for its closing. On the other hand, the roles of *tabaqah* are to (i) provide energy and improve the reading, (ii) use the different voices or *harakat*, and (iii) achieve membership in the reading (Zain, 1990).

The third condition is *Mahatthah* or the place to stop at the end of each song. The roles of *Mahatthah* are (i) diversifying styles *harakat*, (ii) diversifying the reading styles, (iii) adapting to specific verses, and (iv) adapting the style and *tabaqah* of certain verses. Next, the fourth condition is *Qith'ah*. It is the shortest song tempo without any specific *mahatthah*. Viewed in terms of its type, *Qith'ah* is divided into two, (i) *Qith'ah* which discontinues following the word, and (ii) *Qith'ah* which are connected to several words to reach the perfect *mahatthah*. The roles of *Qith'ah* in reciting the *Qur'an* are (i) to raise the style of the actuator, (ii) to stir the starter, (iii) to emphasize the reciter's feeling, and (iv) to provide adaptability to a particular sentence or word (Manzur, 1990).

The fifth condition of the *Quran* song is *Burdah*. *Burdah* is a song of flowers or vibration of sound. It is divided into two types, *Original Burdah* and *Burdah Shina'i*. The *Original Burdah* is a natural vibration of sound (*habits*). On the other hand, the *Burdah Shina'i* is a flower of song that is intentionally arranged and composed according to the requirements of a song (rhythm). *Burdah* has specific properties, namely (i) rough or smooth, (ii) rough or soft, and (iii) much or little. As for the role, *Burdah* is used for (i) having its attractions, (ii) having a driving force, (iii) having a decorator and artistic force, and (iv) having the stimulus and enthusiasm (Soleh, 2002).

Apart from the preceding main conditions, there are several others like *Ikhtilal al-Lahn*, *Wushlah al-Mumatsalah*, the perfection of song, offenses tune, and the specialty of tune. *Ikhtilal al-Lahn* is an intentionally indecency voice tone and *tabaqah* rhythm of a song. It has specific roles such as (i) having its attractions, (ii) having the show, and (iii) highlighting *zauq* reading. Meanwhile, *Wushlah al-Mumatsalah* is available in two forms, namely (i) a style that mixed *harakat* among two the different music rhythms, and (ii) an approach to *harakat* the different songs. The *Wushlah al-Mumatsalah* condition is used when adding art to the *harakat* song, as well as reviving any *harakat* that has been halted and stiffed (Abdullah, 2004).

As for the perfection of the song, each song can be considered perfect, if it fulfills the conditions such as (i) a recitation should be read with no less than four songs, (ii) every tune should be perfect in four *harakat*, (iii) the end tune should be same to the beginning tune, (iv) each song should use Arabic pronunciation, (v) each song should have at least three *tabaqah*, and (vi) each song should be brought smoothly and efficiently (Soleh, 2002). On the other hand, the offensive tune is usually caused by (i) fewer than four types of songs, (ii) less than every *harakat* song, (iii) did not demonstrate the three levels (*tabaqah*) on each song, (iv) there are incestuous tunes in electrifying songs, (v) cover songs (at the end) is not similar to the beginning of the tune, (vi) imitating totally of tune from famous *qari* and *qariah*. Finally, for the specialty of tune, every song of the *Quran* has unique features, such as (i) each song have the perfect four *harakat*, (ii) could bring more than four songs in a certain time, and (iii) having an interesting and electrifying song that suits the *Quran* (Ismail, 1998).

THE FUTURE OF TARANNUM IN COMPUTING RESEARCH

The integration of computing research with *tarannum al-Quran* opens up several potential research areas that can help preserve and enhance this significant tradition (Islami et al., 2020). One area of research is the development of digital tools for teaching and learning *tarannum* (Zakaria et al., 2022). Such tools could include mobile applications, e-learning platforms, and video tutorials that provide users with step-by-step guidance on the correct pronunciation, modulation, and intonation of *Quranic* verses. These tools could also incorporate interactive features such as quizzes, games, and forums to engage learners and promote collaboration among students and teachers. Another potential area of research is the use of natural language processing (NLP) and machine learning (ML) algorithms to analyze and evaluate *tarannum* recitation (Portugal et al., 2018; Vasilakes et al., 2020). NLP techniques can be used to extract phonetic and linguistic features from *Quranic* verses, while ML algorithms can be trained to identify common mistakes in pronunciation and suggest corrections. This

approach could be used to develop personalized feedback and training programs for individual learners based on their strengths and weaknesses.

Furthermore, the integration of tarannum with virtual (VR) and augmented reality (AR) technologies can create new and immersive experiences for performers and audiences. For example, AR technology could be used to provide real-time feedback on pronunciation and intonation during live performances (Tulgar, 2019). VR technology could be used to simulate different performance environments and provide learners with opportunities to practice and perform tarannum in a safe and controlled setting. Overall, the integration of computing research with tarannum al-Quran can help preserve and enhance this significant tradition for future generations. By developing digital tools for teaching and learning tarannum, using NLP and ML algorithms for analyzing and evaluating recitation, and integrating tarannum with VR and AR technologies, computing research can contribute to the advancement and continued relevance of this important aspect of Islamic faith and culture.

CONCLUSION AND RECOMMENDATION

Tarannum, a style of vocal music, is a popular practice in numerous Islamic cultures, particularly in South Asia and the Middle East. The characteristic features of Tarannum include slow, melodious tunes, and the singer's deliberate prolongation of words and syllables, resulting in a calm and introspective atmosphere. Different types of Tarannum exist, each distinguished by unique styles and variations. One of the more significant types of Tarannum is called "Tarannum al-Quran," which entails reciting Quranic verses in a melodious and rhythmic fashion. This style of tarannum is frequently utilized in religious ceremonies and events, as it is thought to enhance the spiritual experience and enable a deeper connection with the Quran. Male singers usually perform tarannum al-Quran, which is regarded as a sacred form of music.

In this article, a simple explanation of the types of tarannum and its condition in reciting the Holy Quran has been presented. Hopefully, people will be able to take benefit from the explanation, especially anyone interested in the field of tarannum. Therefore, it can be concluded that the recitation of the Quran in a melodious way must follow certain rules that require extra effort to master the skill of tarannum. The future of tarannum al-Quran could see an increased use of technology to reach a wider audience and create more immersive spiritual experiences. Social media and digital platforms can facilitate the dissemination of tarannum al-Quran, and emerging technologies such as virtual and augmented reality can enhance the listeners' experience.

Another possibility is the exploration of new styles and forms, including more female performers and fusions with other musical traditions. Additionally, traditional forms that have been lost over time could be revived and preserved through modern recording and production techniques, providing a rich resource for new compositions. Furthermore, tarannum al-Quran has the potential to promote interfaith and intercultural dialogue, serving as a tool for building bridges between different communities and promoting mutual understanding and respect. Collaborative performances, workshops, and cultural exchange programs can help foster a greater appreciation for Islamic culture and its musical heritage. tarannum al-Quran can continue to evolve while remaining a significant part of Islamic culture and spiritual practices.

Finally, the integration of computing research with tarannum al-Quran presents numerous potential research areas. For example, digital tools for teaching and learning can be developed to make tarannum al-Quran more accessible and engaging for learners. NLP and ML algorithms can be used to analyze the patterns and structures of tarannum al-Quran, which can provide insights into its historical and cultural significance. Additionally, Virtual Reality (VR) and Augmented Reality (AR) technologies can be integrated with tarannum al-Quran to create immersive experiences that preserve and enhance this significant tradition for future generations. Overall, the combination of computing research and tarannum al-Quran can lead to innovative solutions that benefit both the religious and technological communities.

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REFERENCES

- Abdullah, A. S. (2004). *Muqaddimah Fi Ilmil Aswat* (1st ed.). International Islamic University of Malaysia.
- Bakar, M. A. B. A. (1997). *Seni Lagu Al-Quran Di Malaysia* (2nd ed.). Darul Fikir.
- Hasri, M. Bin. (2005). *Kursus Tahsin Bacaan Al-Quran Remaja Peringkat Kebangsaan 2005 / 1426*. Jakim.
- Islami, F., Marthasari, G. I., & Cahyono, E. B. (2020). Prototype Aplikasi Pencarian Informasi Ayat Al-Quran Berdasarkan Suara Bacaannya Berbasis Android. *Jurnal Repositor*, 2(5), 561–570. <https://doi.org/10.22219/repositor.v2i5.564>
- Ismail, H. N. J. bin N. (1998). *Buku Qawaid Tarannum*. Darul Fikir.
- Lembaga Bahasa Dan Ilmu Al-Quran. (1987). *Belajar Membaca Al-Quran Dengan Lagu*. DKI Jakarta.
- Manzur, I. (1990). *Lisan al-Arab* (1st ed.). Dar Sader Publisher.
- Munir, M. (2005). *Ilmu & Seni Qiro'atil Quran Pedoman Bagi Qari-Qariah Hafidh-Hafidhah dan Hakim Dalam MTQ* (1st ed.). BINAWAN Semarang.
- Portugal, I., Alencar, P., & Cowan, D. (2018). The use of machine learning algorithms in recommender systems: A systematic review. In *Expert Systems with Applications* (Vol. 97, pp. 205–227). <https://doi.org/10.1016/j.eswa.2017.12.020>
- Said, M. (n.d.). *Sejarah Musabaqah al-Quran*. Arkib Negara Malaysia.
- Salim, K. M. (2004). *Ilmu Nagham al-Quran* (2nd ed.). Pt. Kebayoran Widya Ripta.
- Soleh, A. Q. bin H. (2002). *Kursus Qari dan Qariah* (2nd ed.). Pustaka Aman Sdn.Bhd.
- Tulgar, A. T. (2019). In Between Reality and Virtuality: Augmented Reality in Teaching English to Young Learners TT - Gerçeklik ve Sanallik Arasında: Çocuklara İngilizce Öğretiminde Artırılmış Gerçeklik. *Selcuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 41, 356–364. https://login.lp.hscl.ufl.edu/login?url=https://www.proquest.com/scholarly-journals/between-reality-virtuality-augmented-teaching/docview/2237780672/se-2?accountid=10920%0Ahttps://ufl-flvc.primo.exlibrisgroup.com/openurl/01FALSC_UFL/01FALSC_UFL:UFL?url_ve
- Vasilakes, J., Zhou, S., & Zhang, R. (2020). Natural language processing. In *Machine Learning in Cardiovascular Medicine* (pp. 123–148). <https://doi.org/10.1016/B978-0-12-820273-9.00006-3>
- Zain, D. N. M. (1990). Pertandingan Membaca Al-Quran Dalam Sejarah Tanah Melayu. In *Islam Di Kedah Darulaman*. Perbadanan Perpustakaan Awam Kedah.
- Zakaria, M. Z., Awang, H., Mansor, N. S., Yaakob, M. F. M., Mustapha, R., & Al-Mashhadani, A. F. S. (2022). The Requirement Scheme for Tarannum Smart Learning Application. *Journal of Contemporary Social Science and Education Studies*, 2(2), 23–29.