**KUESIONER TENTANG**

**“PEMETAAN FONEM KE VISEME BAHASA INDONESIA”**

Pengantar :

Dalam berkomunikasi dengan menggunakan input teks, diperlukan sebuah pemetaan fonem (*phoneme*) ke viseme (*visual phoneme*). Fonem adalah unsur bahasa terkecil yang dapat membedakan arti atau makna. Setiap bunyi bahasa apabila terbukti dapat membedakan arti, maka dapat disebut fonem. Fonem adalah unit terkecil suara yang merupakan dasar untuk membangun sebuah ucapan manusia (*human speech*). Viseme diturunkan dari sekelompok fonem yang memiliki penampilan visual sama dan merupakan unit ekivalen dalam domain visual yang memodelkan sistem pengenalan ucapan secara audio-visual.

Fonem yang digunakan dalam penelitian ini ada 49 fonem, yang terdiri dari 13 vokal dan 36 konsonan. Ke-13 vokal, terdiri dari 10 vokal tunggal dan 3 vokal diftong. Ke-36 konsonan, terdiri dari 21 konsonan tunggal dan 15 konsonan ganda. Sedangkan viseme yang mewakili bentuk mulut secara visual ada 11 viseme dan 1 viseme netral. Berikut daftar fonem yang digunakan :

Example of the application in a word for IPA Indonesian Vowels, as seen table 1 below. Phonemic position of the consonant and vowel phonemes in the Indonesian language appears in beginning, middle and end positions.

Table 1 Example of Indonesian Vowels in a Word

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Vowel** | **Phoneme** | **IPA Symbol** | **Phonemic Position** | | | **Description** |
| **Beginning** | **Middle** | **End** |
| a | /a/ | ɑ | **a**ir [**ɑ**ir] = water | su**a**ra [su**ɑ**ra] = sound | rahasi**a [**rahasi**ɑ**] = secret | Pronounced like the *a* in *father* |
| e1 | /ə/ | ə | **e**mas [**ə**mas] = gold | p**e**rgi [p**ə**rgi] = go | kod**e** [kod**ə**] = code | Pronounced like the *a* in *ago*. This is the most common *e* sound when compared to the others |
| e2 | /e/ | e | **e**ja [**e**ja] = spelling | s**e**rius [s**e**rius] = serious | sor**e** [sor**e**] = afternoon | Pronounced like the *e* in *bed* or *dress* |
| e3 | /ε/ | ε | **e**lektronik [**ε**lεktronik] = electronic | intern**e**t [intərn**ε**t] = internet | gu**e** [gu**ε**] = I or me | Pronounced like the *ei* in *eight*. Some older dictionaries will write it as *é*, but the IPA symbol *e* is gaining more acceptance in regards to standardization. This is the least common *e* when compared to the others. |
| i1 | /i/ | i | **i**kan [**i**kan] = fish | man**i**s [man**i**s] = sweet | har**i** [har**i**] = day | Pronounced like the *ee* in *feet* |
| i2 | /I/ | I | nothing | ker**i**ng [ker**i**ng] = dry | nothing | Pronounced like the *e* in *lift*. If a syllable ends with this vowel, then use this sound with one exception |
| o1 | /o/ | o | **o**bat [**o**bat] = drug | bir**o**krasi [bir**o**krasi] = bureaucracy | baks**o** [baks**o**] = meet ball | Pronounced like the *o* in *lose* |
| o2 | /O/ | ɔ | **o**rang [**ɔ**rang] = people | r**o**b**o**t [r**ɔ**b**ɔ**t] = robot | rom**o** [rom**ɔ**] = priest | Pronounced like the *o* in *stop*. If this vowel is in an unstressed, closed syllable, then use this sound. Also, if a syllable ends with this vowel and the following syllable also contains this vowel, then use this sound. |
| u1 | /u/ | u | **u**dang [**u**dang] = shrimp | p**u**sat [p**u**sat] = central | sat**u** [sat**u**] = one | Pronounced like the *oo* in *soon* |
| u2 | /U/ | ʊ | unta [**ʊ**nta] = camel | bel**u**m [bəl**ʊ**m] = not yet | nothing | Pronounced like the *o* in *do* |

A diphthong is the combination of two vowels as seen table 2. In English, these vowels often represent just a single sound. This is not the case in Indonesian because each vowel must be clearly pronounced when speaking.

Table 2 Example of Indonesian Vowels Diphthong in a Word

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Vowel Diphthong** | **Phoneme** | **IPA Symbol** | **Phonemic Position** | | | **Description** |
| **Beginning** | **Middle** | **End** |
| ai | /ɑi/ | ɑy | nothing | nothing | pant**ai** [pant**ɑy**] = beach | Pronounced like the *a* in *father* followed by the *ee* in *meet*. Both sounds should be clearly spoken. |
| au | /ɑu/ | ɑw | nothing | nothing | pul**au [**pul**ɑw] =** island | Pronounced like the *a* in *father* followed by the *oo* in *moon*. Both sounds should be clearly spoken. |
| oi | /oi/ | oy | nothing | nothing | amb**oi** [amb**oy**] = enjoy | Pronounced like the *o* in *low* followed by the *ee* in *meet*. Both sounds should be clearly spoken. |

A consonant is a sound produced by the restricted flow of air in the vocal chords. There are twenty one consonants in Indonesian. While most are pronounced relatively close to English, some are quite different, like *c* and *r*. Some are silent depending where they are located in the word, as seen table 3 below:

Table 3 Example of Indonesian Consonant in a Word

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Consonant** | **Phoneme** | **IPA Symbol** | **Phonemic Position** | | | **Description** |
| **Beginning** | **Middle** | **End** |
| b | /b/ | b | **b**aru [baru] = new | sa**b**tu [sa**p**tu] = saturday | sebab [seba**p**] = because | Pronounced like the *b* in *bed*. It's nearly silent when the last letter of a word. Somewhat rare, words borrowed from the Arabic language most often use it. |
| c | /c/ | tʃ | **c**antik [**c**antik] = beauty | ben**c**i [bən**c**i] = hate | nothing | Pronounced like the *ch* in *church*. It never appears at the end of a word. |
| d | /d/ | d | **d**ari [**d**ari] = from | ba**d**an [ba**d**an] = body | aba**d** [aba**t**] = century | Pronounced like the *d* in *dog*. It's nearly silent when the last letter of a word. |
| f | /f/ | f | **f**ilm [**f**ilm] = film | hafal [ha**f**al] = memorize | tari**f** [tari**f**] = fare | Pronounced like the *f* in *fat*. It often represents the *v* sound as well. |
| g | /g/ | g | **g**ila [**g**ila] = crazy | la**g**u [la**g**u] = song | bude**g [**budə**k] =** deaf | Pronounced like the hard *g* in *gun*, but never like the soft *g* in *germ*. It seldom appears at the end of a word. |
| h | /h/ | h | **h**utan [**h**utan] = forest | ba**h**an [ba**h**an] = material | ruma**h** [ruma**h**] = house | Pronounced like the *h* in *happy*. One must take special care to fully pronounce it when at the end of a word or the meaning could change. |
| j | /j/ | ʤ | **j**alan [**j**alan] = street | la**j**ur [la**j**ur] = line | nothing | Pronounced like the *j* in *judge*. The sound is closer to the Dutch symbol *dj*. It never appears at the end of a word |
| k | /k/ | k | **k**aya [**k**aya] = rich | bu**k**an [bu**k**an] = not | jele**k** [jәlε**k**] = bad | Pronounced the same as in English, but never aspirated. It often represents the *q* sound as well. It's nearly silent at the end of a word. |
| l | /l/ | l | **l**ogam [**l**ogam] = metal | ke**l**as [ke**l**as] = class | kapa**l** [kapa**l**] = ship | Pronounced the same as in English. |
| m | /m/ | m | **m**akan [**m**akan] = eat | ka**m**u [ka**m**u] = you | sala**m** [sal**am**] = regards | Pronounced the same as in English. |
| n | /n/ | n | **n**ama [**n**ama] = name | pi**n**tar [pi**n**tar] = smart | kebu**n [**kebu**n] =** garden | Pronounced the same as in English. |
| p | /p/ | p | **p**aman [**p**aman] = uncle | lu**p**a [lu**p**a] = forget | ata**p** [ata**p**] = roof | Pronounced the same as in English, but never aspirated. It's nearly silent at the end of a word. |
| q | /q/ | k | **q**ur’an [**q**ur’an] = **q**ur’an | wu**q**uf [wu**q**uf] = wuquf | bali**q** [bali**q**] = adult | Pronounced more like a *k* rather than a *q*. Somewhat rare, words borrowed from the Arabic language most often use it. |
| r | /r/ | r | **r**amah [**r**amah] = friendly | ke**r**as [kə**r**as] = hard | baka**r** [baka**r**] = burnt | Pronounced more like the trilled or rolled Spanish *r*. |
| s | /s/ | s | **s**uka [**s**uka] = like | ka**s**ur [ka**s**ur] = mattress | halu**s** [halu**s**] = smooth | Pronounced the same as in English |
| t | /t/ | t | **t**eman [**t**eman] = friend | se**t**iap [se**t**iap] = each | badut[badu**t**] = clown | Pronounced like the *t* in *tap* or *top*, but never aspirated. It's nearly silent at the end of a word. |
| v | /v/ | f | **v**alid [**v**alid] = valid | lar**v**a = flyblow | nothing | Pronounced more like an *f* rather than a *v* |
| w | /w/ | w | **w**anita [**w**anita] = woman | ra**w**a [ra**w**a] = bush | nothing | Pronounced the same as in English except with less rounded lips. It never appears at the end of a word |
| x | /x/ | ks | **ks**atria [**ks**atria] = hero | nothing | e**ks** [e**ks**] = ex | Pronounced the same as in English. Somewhat rare, it often accommodates words borrowed from other languages. |
| y | /y/ | j | **y**akni [**y**akni] = namely | sa**y**ur [sa**y**ur] = vegetable | nothing | Pronounced like *ye* as in *yes* or *yet* |
| z | /z/ | z | **z**aman [**z**aman] = era | le**z**at [le**z**at] = delicious | azi**z** [aji**s**] = name’s person | Pronounced the same as in English. Somewhat rare, it often accommodates words borrowed from other languages. |

A compound is two or more adjacent consonants in a word. In Indonesian, there are fifteen distinct compounds, as seen table 4 below:

Table 4 Example of Indonesian Consonant in a Word

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Consonant** | **Phoneme** | **IPA Symbol** | **Phonemic Opposition** | | | **Description** |
| **Beginning** | **Middle** | **End** |
| dh | /dh/ | dh | **dh**uafa [**dh**uafa] = poor | bag**dh**ad [bag**dh**ad] = bagdhad | mudlara**dh [**mudlara**dh]** = not usefull | Pronounced more like a *k* rather than a *q*. Somewhat rare, loandwords from the Arabic language most often use it. |
| dl | /dl/ | dl | **dl**uhur [**dl**uhur] = praying in afternoon | rama**dl**an [rama**dl**an] = month for fasting | fari**dl** [fari**dl**] **=** one of name person | Pronounced more like a *k* rather than a *q*. Somewhat rare, loanwords from the Arabic language most often use it. |
| dz | /dz/ | dz | **dz**ikir [dzikir] = pray | mua**dz**in [mua**dz**in] = muezzin | mahfu**dz [**mahfu**dz**] **=** one of name’s person | Pronounced more like a *k* rather than a *q*. Somewhat rare, loandwords from the Arabic language most often use it. |
| gh | /gh/ | gh | **gh**aib [ghaib] = supernatural | ma**gh**rib [ma**gh**rib] = praying in evening | mubali**gh [**mubali**gh] =** preachers | Pronounced more like a *k* rather than a *q*. Somewhat rare, loandwords from the Arabic language most often use it. |
| kh | /kh/ | x | **kh**aliq [**kh**aliq] = god | a**kh**ir [a**kh**ir] = end | tari**kh** [tari**kh**] = term of islamic | Pronounced like a *ch* in the Scottish word *loch*. Many words borrowed from the Arabic language use it. |
| ks | /ks/ | ks | **ks**atria [kesatria] = hero | e**ks**klusif [e**ks**klusif] = exclusive | te**ks** [te**ks**] = text | Pronounced more like a *x* in *tax*. Somewhat rare, it often accommodates words borrowed from other languages. |
| ph | /ph/ | ph | **ph**i [**f**i] = constanta of 3,14 | atmos**ph**er [atmos**f**er] = atmospher | gra**ph** [gra**f**] = graph | Pronounced like a *ph* in physic or f in Indonesia. Many words borrowed from the English language use it. |
| ps | /ps/ | ps | **ps**ikologi [**ps**ikologi] = psycology | nothing | ti**ps** [ ti**ps**] = fee | Pronounced like a *ps* in psycology. Somewhat rare, it often accommodates words borrowed from other languages. |
| sy | /sy/ | ʃ | **sy**ukur [**sy**ukur] = thanks god | ma**sy**arakat [ma**sy**arakat] = society | ar**sy** [ar**sy**] = throne | Pronounced like the *sh* in *shop*. Somewhat rare, words borrowed from the Arabic language most often use it. |
| sh | /sh/ | sh | **sh**olat [**s**olat] = pray | a**sh**ar [a**s**ar] = asr | nothing | Pronounced like the sh in push. Somewhat rare, words borrowed from the Arabic language most often use it. |
| th | /th/ | Ɵ | **th**erapi [terapi] = therapy | an**th**ropologi [an**t**ropologi] = anthropology | nothing | Pronounced like *th* in *think*. |
| ts | /ts/ | ts | **ts**unami [**s**unami] = tsunami | nothing | hadi**ts** [hadi**s**] = hadits | Pronounced like *ts* in *tsunami.* |
| ng | /ng/ | ŋ | **ng**antuk [**ng**antuk] = sleepy | ta**ng**an [ta**ng**an] = hand | lamba**ng** [lamba**ng**] = symbol | Pronounced like the soft *ng* in *singing.* In the beginning position often used to vernacular. |
| ny | /ny/ | nj | **ny**onya [**ny**onya] = Mrs. | me**ny**anyi [me**ny**anyi] = sing | nothing | Pronounced like the *ny* in *canyon.* |
| ngg | /ngg/ | ŋg | **ngg**antung [**ngg**antung] = hang | ta**ngg**a [ta**ngg**a] = leather | nothing | Pronounced like the hard *ng* in *mango.* In the beginning position often used to vernacular. |

Terima kasih atas bantuannya.

Salam hormat dari peneliti,

Endang Setyati

Kandidat Doktor dari Teknik Elektro ITS Surabaya

**Mohon identitas ini diisi ya,**

**Nama (dengan gelar)** : Tajudin Noor, S.Kom

**Jenis Kelamin** : Laki-Laki

**Usia** : 40 tahun

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**Pekerjaan** : (Dosen / ~~Guru~~) di Politeknik Negeri Banjarmasin

**Alamat (nama kota)** : Jalan Brigjend H Hasan Basry Banjarmasin Kalimantan Selatan

Isilah dengan tanda (**V**) pada pilihan skor 1, 2, 3 atau 4, yang mewakili penilaian mulai dari “**TIDAK SESUAI SAMA SEKALI**” sampai dengan “**SESUAI**” terhadap bentuk mulut yang diwakili oleh wajah animasi 3D. Mohon kiranya diisi dengan sebenarnya. Terima kasih.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Kelas Viseme** | **Bentuk Mulut dari Model Wajah Animasi 3D** | **Fonem**  **dan cara**  **baca fonem** | **Visualisasi bentuk mulut diwakili wajah animasi 3D** | | | |
| **1 (tidak sesuai sama sekali / berbeda)** | **2 (agak tidak sesuai)** | **3 (agak sesuai)** | **4 (sesuai)** |
| Viseme 1 |  | p (әp) |  |  |  | V |
| b (әb) |  | V |  |  |
| m (әm) |  |  | V |  |
| Viseme 2 |  | f (éf) |  | V |  |  |
| v (év = éf) |  |  | V |  |
| w (éw)\* |  |  |  | V |
| ph (éf) |  | V |  |  |
| Viseme 3 |  | d (әd) |  |  | V |  |
| dh (әdh =әd)\* |  |  | V |  |
| dl (әdl= әd)\* |  | V |  |  |
| dz (әdz=әd)\* |  |  | V |  |
| l (әl) |  |  |  | V |
| n (әn) |  |  |  | V |
| t (әt) |  |  |  | V |
| th (әth=әt)\* |  |  |  | V |
| Viseme 4 |  | r (ér) |  |  |  | V |
| Viseme 5 |  | c (әc=әs)\* |  |  | V |  |
| j (әj=әs)\* |  |  | V |  |
| ks (әks) |  | V |  |  |
| s (әs) |  |  | V |  |
| sh (әsh)\* |  | V |  |  |
| sy (әsy=әs)\* |  | V |  |  |
| ps (әps=әs)\* |  | V |  |  |
| ts (әts=әs)\* |  | V |  |  |
| x (әx=eks)\* |  | V |  |  |
| y (әy)\* |  |  | V |  |
| z (әz=әs)\* |  | V |  |  |
| ny (әny)\* |  | V |  |  |

Catatan: (\*) akhiran dalam bahasa Indonesia hampir tidak ada, bahkan bisa tidak ada sama sekali.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Kelas Viseme** | **Bentuk Mulut dari Model Wajah Animasi 3D** | **Fonem**  **dan cara**  **baca fonem** | **Visualisasi bentuk mulut diwakili wajah animasi 3D** | | | |
| **1 (tidak sesuai sama sekali / berbeda)** | **2 (agak tidak sesuai)** | **3 (agak sesuai)** | **4 (sesuai)** |
| Viseme 6 |  | g (әg) |  |  | V |  |
| gh (әgh=eg)\* |  | V |  |  |
| h (әh) |  |  |  | V |
| k (әk) |  |  | V | V |
| kh (әkh)\* |  |  | V |  |
| q (әq=ek)\* | V |  |  |  |
| ng (әng) |  | V |  |  |
| ngg (әng)\* | V |  |  |  |
| Viseme 7 |  | a (ah) |  |  |  | V |
| Viseme 8 |  | i (ih) |  |  | V |  |
| I (ih)\* |  |  | V |  |
| Oi (oiii) |  |  |  | V |
| Viseme 9 |  | ə (əh) |  |  |  | V |
| e (eh) |  |  | V |  |
| ε (éh) |  | V |  |  |
| ai (pantai=panté) | V |  |  |  |
| Viseme 10 |  | o (oh) |  |  | V |  |
| O (Oh) |  |  | V |  |
| au (pulau=pulO) |  | V |  |  |
| Viseme 11 |  | u (uh) |  |  |  | V |
| U (Uh=uh)\* |  |  | V |  |
| Viseme 12 |  | Silent  (posisi mulut diam tertutup / netral) |  |  |  | V |

Catatan: (\*) akhiran dalam bahasa Indonesia hampir tidak ada, bahkan bisa tidak ada sama sekali.

-- Selesai, terima kasih --