**Algorithm 2** Query CTI\_SyscallSynonymBase

**Input** TargetSent /\* a sentence segment in CTI document which   
 contains STobj \*/

STobj /\* a STobj represent the word mapping a STregex   
 from ASG \*/

**Output**  MatchedSyscalls [] /\* the descriptive verb in sentence may match 0   
 or more system calls (1-D array) \*/

/\* Get the descriptive verb of STobj, return if not found \*/

*nlp*  ← denpency\_parse(*TargetSent*, *STobj*)

*verb* ← find\_subject\_verb(*nlp*, *STobj*)

**if** *verb* is None **then**

**return** empty list []

**end if**

/\* If the descriptive verb is in SynonymBase, get the correspondence system calls base on the verb and object type \*/

Initialize *SynonymList* [] ← load\_synonym\_base()

*entityType* ← classify\_object\_entity(*STobj*)

**if** *verb* query\_all\_verbs(*SynonymList*) **then**

**return** query\_mapped\_syscall(*SynonymList*, *verb*, *entityType*)

**end if**

/\* If the descriptive verb is not included, get a alternative verb from SynonymBase with most similar word embedding \*/

/\* Continue the correspondence syscall lookup process same as above \*/

*wv* ← bert\_embedding(*TargetSent*, *verb*)

*alternativeVerb* ← query\_nearest\_verb(*SynonymList*, *wv*, *entityType*)

**return** query\_mapped\_syscall(*SynonymList*, *altVerb*, *entityType*)