Journal of Computer Graphics and Multimedia Applications

Volume No. 9

Issue No. 2

May - August 2025

ENRICHED PUBLICATIONS PVT. LTD

S-9, IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR-5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-47026006

Journal of Computer Graphics and Multimedia Applications

Aims and Scope

Global Journal of Computer Graphics & Techniques provides a medium to communicate information concerning interactive CG and CG applications. The journal focuses on interactive computer graphics, visualization and novel input modalities including virtual environments, and, within this scope, on graphical models, data structures, languages, picture manipulation algorithms and related software.

Journal of Computer Graphics and Multimedia Applications

Journal of Computer Graphics and Multimedia Applications

(Volume No. 9, Issue No. 2, May - August 2025)

Contents

Feature Extraction Methods in 3D Medical Images

[1] Dhanya K Sudhish, [2] Latha R Nair

[1]Research Scholar, Division of Computer Science , School of Engineering, CUSAT, India

[2]Associate Professor in CSE, Division of Computer Science, School of Engineering, CUSAT, India

E-mail: [1]dhanyaksudhish@cusat.ac.in, [2]latha5074@gmail.com

ABSTRACT

Detection and classification of abnormal growth of cells in brain are very significant in clinical practices. MRI is the most efficient non-invasive practice for detection of abnormal and uncontrollably growing cells in human body. The identification of cancerous cells by visual examination of MRI is a subjective judgment by the clinical practitioner. Content Based image retrieval (CBIR) is the powerful method to locate an image in a very large database. The application of CBIR approach in for medical image management to fetch similar cases from huge Image database is very relevant in the current scenario. This paper aims to analyse recent works done in feature extraction of MRI images and the relevance of CBIR in medical image management. Identifying relevant cases from the MRI database using CBIR helps the physician in the diagnosis. Efficient feature extraction methods facilitate accurate decision making in the classification and retrieval of images.

Keywords - Feature Extraction, MRI, Content Based Image Retrieval (CBIR), Classification.

I. INTRODUCTION

Brain tumor pathology is becoming a major mortality issue all over the world in recent years. Early detection and treatment of brain tumors assure cure from the disease. Magnetic Resonance Imaging (MRI) is widely used by radiologist to study human body anatomy. No known risk is present with MRI imaging modality compared with other imaging modality like Computed Tomography (CT) and Positron Emission Tomography (PET). MRI gives good contrast between different soft tissues like white matter, gray matter, cerebrospinal fluid, lesion, tumor cells and skull. Content Based Image retrieval (CBIR) approach aims to represent the image with non- textual features and not with the metadata associated with the image. Huge volume of medical imaging data is generated during clinical routine due to the advancement in medical image acquisition technology. To store and retrieve information from large database CBIR is most efficient. Image queries to the database are related to the similar images based on features in the image. This approach aids great support for clinicians in diagnosis and decision making. As a part of clinical pathology, the quantitative and qualitative analysis of normal and abnormal structures in brain of each subject has to be done in time and space scale for effective treatment.

The most important step in the construction of any Content Based Image Retrieval system is to find the correct method for the extraction of feature vector of the image and the correct similarity metric that

efficiently group visually similar images together. The images are indexed according to their visual contents such as texture, color, shape or any other feature or a combination of a set of Brain tumors can be malignant or benign. According to the guidelines of World Health Organization, tumors are classified using a grading system, a scale from grade I to grade IV. The benign tumor cells have a uniformity in structure and are non-active, fall under grade I and II. High grade tumors fall under grade III and grade IV are classified as malignant tumors and possesses active cancerous cells. Low grade brain tumors need serial monitoring. If these tumors are left untreated, these are likely to turn into malignant at a later stage. Imaging and observation of these tumors are done every six months. In evidence based medicine or case based diagnosis the retrieval of relevant and similar cases for comparison is significant [1]. Content Based Retrieval in medical field is intended to better understanding of the disease. High degree of content understanding is required to retrieve images from medical database for comparative diagnosis. Feature extraction methods need to be most efficient for content based retrieval approach. This paper summarizes different feature extraction methods in MRI brain images for the retrieval of similar images from database.

II. PREPROCESSING METHODS

The presence of noise in Magnetic Resonance Image are very less compared to other imaging modality. Noise in MRI images is mainly due to fluctuations of the magnetic field in the coil. During image acquisition, intensity in homogeneity occurs due to non-uniformity in radio frequency, which in effect results in shading artifacts [2]. For diagnostic purpose using MRI image high resolution and high contrast images are required. Noise filter is applied on MRI only fine details in the image are retained. Contrast to Noise Ratio (CNR) and Signal to Noise ratio(SNR) have significant role in MRI tumor diagnosis,[3]. Adaptive filter and wavelet filters can be used for reduced edge blurring effects. The non-linear filter and median filter remove noise preserving edge details. Median filter is one of the best noise removal method for medical images [4]. Each pixel or voxelentry is replaced with the median value of its neighboring entries.

Intensity normalization is done in the preprocessing stage of MRI images due to intra scan and inter scan variations in image intensity. In paper [3], six intensity normalization techniques are listed, Contrast stretching, histogram stretching, histogram equalization, histogram normalization, intensity scaling and Gaussian kernel normalization. The paper [5] claims best performance for histogram normalization compared to other methods. The background information of Brain MRI images increases processing time and uses more memory. Removal of background information (skull stripping) are done during preprocessing. In many medical application skull stripping is significant for effective examination of tumor from the brain MRI images. In skull stripping, all non-brain tissues like

fat, skin and skull are removed from Brain MRI [6]. Popular techniques for skull stripping are image contour, morphological operations, segmentation and histogram analysis.

III. 3D CONTENT-BASED IMAGE RETRIEVAL FRAMEWORK

A typical 3D content-based image retrieval framework is show in the figure 1.

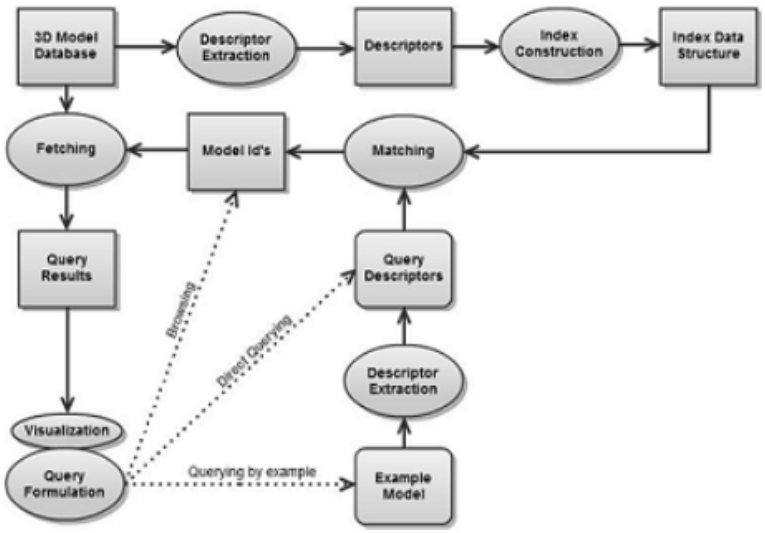


Figure 1

It consists of a database with an index structure created offline and an online query engine. 3D shape descriptors are used to define each 3D model. An indexing data structure along with a searching algorithm is needed to retrieve 3D models online from a large 3D database. The 3D model retrieval proceeds in four major steps: (1) indexing, (2) querying, (3) matching and (4) visualizing. The first step in the framework is done off line and next steps are done online. The first step includes representation of 3D volumes in terms of defined feature vector and indexing or classification. The online query engine computes the feature vector of the given query and measures the distance similarity between the query and the database entries. The fetching module retrieves similar 3D models which matches with the given query.

IV. FEATURE EXTRACTION

Feature extraction is the process of collecting high level of information like texture, color, gray level, shape, contrast etc. from an image for analysis. In the feature extraction stage, the most prominent features are to be selected. These are the inputs to the classifier. The feature vector forms the collection of relevant set of features defined for the application and it forms the reduced representation of the original image data. Features are of typically two types: (1) Primitive features color, texture and shape (2) Domain specific feature vector single or a combination of features which are application specific. In 3D Volume retrieval, defining certain object aspects and extracting their numeric values from the 3D

Volumes are done and create Feature vector which is application specific. Feature vector bridges the gap between the visual content and its numerical representation. From the raw pixel intensities Photometric features are derived which exploits color and texture. Shape based descriptors form Geometric feature.

A. Color Feature

Color feature was one of the earlier CBIR feature representation method. The image characteristics can be obtained using color histogram. Most of the medical images are grayscale so the color cue are rarely used in medical context. Color feature can be used in ophthalmology, pathology, dermatology, nuclear cardiology or when color is used to scale flow velocity. In medical CBIR, color features are less useful.

B. Texture Feature

Texture feature encodes the spatial orientation of pixel intensities. With the use of standard transform domain analysis tools, texture features can be extracted. Fourier transform, wavelet, Gabor or stock well filters are the common analysis tools. In medical imaging, texture features reflect the details contained within the image structure. Tumors, lesion and solid nodules exhibit uniform intensity density. In 3D medical images, texture features can be extracted from 3D volumes as they are stack of 2D slices. Slice-by-slice approach suffers from missing information that are interlaced within the volumetric data. Spatial structural information needs to be extracted from cubes rather than surface or square.

C. Shape Descriptors

Shape information is derived from the image using geometric cues such as edges, contours, joints, polylines or polygonal regions. Geometric features are powerful when objects in 3D volumes can be clearly separated from the surroundings. Shape descriptors represent the image content in the form of point sets, contours, curves, regions or surfaces. Firstly a shape representation is extracted from the pixel intensities by region-of-interest for 2D images and volume-of-images for 3D images, by detection, segmentation and classification. Shape descriptors are highly used in the detection of tumors/lesions or understanding its evolution.

In medical context, semantic features can be derived with the help of human experts. With image descriptors, annotation can be included. Annotation tries to fill the semantic gap. Expert-in-loop approach can be adopted to deal with semantic gap in the medical CBIR.

V. RECENT WORKS

A multimodal content based image retrieval system handling MRI and CT images proposed in [11]. For image similarity, anatomical structure of brain is considered and indexing and retrieval are implemented using visual and collateral information of 3D MRI volumes are used. In this paper the authors with the help of neurologist, identified five salient feature mass effect, Anatomical location, Density, Contrast enhancement and Boundary, which have significant semantic meaning in interpreting brain MRI images. Hao, kim et al. [12] proposed Volume of Interest (VOI) feature representation and retrieval of multidimensional PET images with 3D spatial and 1D temporal domain. Along with texture features, the work proposed, VOIs represented by location based on 3D standard atlas, physiological temporal kinetics and parametric estimate, volume and surface distribution using spatial and temporal domain together for feature extraction and retrieval. Li, Chen et al. [13] proposed a method for 2D contour matching and 3D partial retrieval from a 3D volume. 2D image slices in the stack of a 3D volume are segmented into object contours. In the adjacent 2D slices, related object contours are linked to form a 3D component from that 3D volume. Contour matching is done using Fuzzy Logic System (FLS). A high dimensional feature set is generated from two types of features- image based features and alignment based features [14]. Image based features are extracted using Gabor wavelet filter and alignment based feature method use three types of templates, spatial likelihood, average intensity and left-to- right symmetry.

In the paper [15] W.Cai et al. described CMRGIc [cerebral metabolic rate of glucose consumption] texture feature with volumetric co-occurrence matrices from neurological FDG (fluoride oxyglucose). Pet images are extracted using adaptively designed pathology-centric masks. Feature extraction in this comprises of functional normalization of CMRGic images and PCM based volumetric texture feature extraction. . Liu et al. [16] developed a 3D curvelet transform (DcVT) based Content based retrieval on 3D functional neuro imaging database. 3D curvelet transform is used to extract localized volumetric texture features. The 3D- DcVT approach captures the innate volumetric property beyond the scope of two dimensional methods. In this system, the non VOI regions are filtered out with the localized feature extraction from DOMs (disorder-oriented mask). MIRAGE [17], a texture based on line CBIR system for 3D MRI images. Four texture based approaches are used: 3D Local Binary Pattern (LBP), 3D Grayscale level Co- occurrence Matrices (3D GLCM), 3D Wavelet transform and 3D Gabor transform. For local feature description, different parts of brain in the 3D volume are divided into 64 non-overlapping equally sized blocks, giving 4 block along each of x, y, z axes. Using 3D LBP texture feature are extracted to generate feature database.

The 3D CBIR medical image retrieval scheme based on three stages has been proposed by Azhar Quddus and Otman Basir [1]. In the first stage, an SVM-based technique for identifying a 3D volume using an incoming 2-D query image is done. In the second stage, an SVM-based, semantic classification technique is proposed for classifying the incoming 2- D query image into one of the four semantic regions and the registration based image retrieval is done. The work [18] used a multi scale and multi neuro imaging feature extraction with degenerative pattern with 3D Gabor filter for 3D content based analysis and retrieval of images. The paper gave a comparative evaluation with 3D discrete curvelet transform based method and 3D spatial grey level co-occurrence matrices based methods. S.Dong et al.[19] proposed a method on 3D CT images for classifying local structures present in the images into line like, blob- like or sheet-like patterns, in different sizes by using second order derivatives in multi scale space. Queries are given the size and type to extract specified local structures from the volume data. A 3D statistical feature extraction method for the segmentation of tumors and lesion in brain MRI volumes is proposed in [20]. The method is implemented on a database of 18 T1 weighted brain volumes. A statistical descriptor is defined with first order and second order features calculated from each cube window. Central pixel intensity along with the mean and variance of intensities of other voxels in the cube form the first order feature. The relationship among the voxels in each cube describes the texture features as second order feature, 3D GLCM for cube size of wxwxw are considered with window size, 'w' and voxel separation -d and d voxels, form the texture features. Jiang et al. proposed an algorithm to generate a graph by learning population and patient specific feature set for segmentation in brain MRI images [21]. For feature extraction, the authors developed a Gabor filter group in several directions and scales, and image modality features are included. Real-Adaboost classification is employed for voxel classification for finding the probabilities of whether a voxel to be present on the foreground or background in an image.

Sachdev J. et al. [22] used a content based active contour model to extract 856 Region of Interest (ROI) from the MRI images of 55 patient and 218 features are extracted from these region of Interest. These 218 features are extracted using Laplacian of Gradient (LOG), Directional Gabor texture feature (DGTF), Rotational Invariant Circular Gabor Features (RICGF), Rotational Invariant Local Binary Pattern (RILBP) and Intensity Based Features (IBF). The feature reduction is achieved using PCA (Principal Component Analysis), classification using Artificial Neural Network (ANN) and an overall accuracy of 85.23% is obtained. Xianhong [23] developed an online CBIR system in which the content features of 3D MRI brain images and 3D ultra sound cardiac video sequences are represented using 3D SIFT descriptors coupled with sparse code. Feature vectors are extracted using 3D SIFT descriptors and a code book of vocal dictionaries created using the sparse coding of feature vector. The method is implemented for both still and motion images of different modalities.

Rahim et al. presented [24] a detailed 3D feature extraction based on texture features and Support Vector Machine kernel (SVM) based segmentation. SVM image characterization is done using GLCM (Gray Level CO-occurance Matrix) features like correlation, homogeneity, contrast, angular second momentum, variance, cluster tendency, mean, standard deviation entropy, and inverse different momentum. GLCM features are calculated in 0˚, 45 ˚, 90 ˚ and 135˚ directions from NxN image matrix. Mani et al. [25] proposed a volumetric texture classification inspired from local frequency descriptor (LFD). The method includes 2D and 3D gradient calculation, the gradient information are calculated on the XY- Z orthogonal planes at each voxel. The proposed method is compared with 3D volumetric GLCM, 3D LBP(Local Binary pattern) and SOP(Second order pyramid)and shows excellence in accuracy, robustness and speed. Authors [7] developed a fully automated system to identify slices and segmenting the tumors with appreciable and less computational complexity. The paper compares the efficiently of Gabor filter features and statistical features using different classifiers. The tumor detection performed by comparing the mutual information histogram of both brain hemisphere. Gabor wavelet method extracts the locality, orientation and frequency. the statistical feature extraction in this paper is done using Gray Level Co- occurrence Matrix (GLCM), Gray Level Run Length Matrix (GLRLM), Local Binary Pattern(LBP) and Histogram of Gradient(HOG).

In the paper [26] 3D models are generated from magnetic Resonance Imaging slices and depth information are included. These models are used to search similar images among 3D annotated medical cases. The 3D models generated comprise both global and local descriptors. The information about the deformation degree and the places they occur are extracted, stored and compared using spectral clustering method and classified into Congestive Heart Failure (CHF) and non CHF. R. Maani et al.

[27] extended 2D GLCM to define texture features on a voxel by voxel basis (VGLCM-3D) in 3D T1-weighted MRI brain images of AD(Alzheimer's Disease) patients. Eight texture features were extracted using VGLCM-3d and VGLCM-TOP- 3D GLCM over Three Orthogonal Planes and achieved an accuracy of 100%. A feature set with 35 features extracted from MRI of brain using GLCM(Gray Level Co-occurrence Matrix), GLRLM(Gray Level Run Length Matrix), shape based feature and statistical features classify the images into tumour affected and not affected [28]. Results showed SVM (Support Vector Machine) performed better than Neural Network classifier. A novel method for texture analysis based on voxel based approach is implemented in [29] and validation on MRI data set of Alzheimer's Diseases (AD) patients. Author extended the 2D GLCM to 3D images on voxel by voxel basis and experiment results are analysed on T1-weighted MRI data set. In the paper [30] an automated system extracts features from the Guassian Mixture Model (GMM) curve fitting of the image histogram of T1-w, T2-w and FLAIR (Fluid-attenuated inversion recovery) images and the

GMM features are validated with wavelet features. Principal component analysis (PCA) is used for feature reduction and appropriate features from the feature vector are gathered. The method claims a performance accuracy of 97.05% for T1-w, 91.70% for T2-w and 94.11% for FLAIR MRI images. In the paper [31], authors used MGLCM (Modified Gray level coo-occurrence matrix) for feature extraction, the feature selection is achieved with ANOVA (Analysis Of Variance). The experiment is done on four imaging modalities T1-W, T1c-W, T2-w and FLAIR and classifier used is Multilayer Perception Neural Network(MLPNN), obtained an accuracy of 89% compared to manual process.

The work [32] detected Brain MRI slices and classify into normal and abnormal. Bilateral symmetry of two hemispheres of brain is considered, 21 co-occurrence statistics obtained from Modified Gray Level co- occurrence Matrix extracted the features and achieved an accuracy of 97.8 % using MLPNN. The work in [33] explained the brain tumor segmentation using Berkly wavelet transform and by analysing the GLCM features, the classification is done using SVM (Support Vector Machine). Histogram based feature extraction and feature based investigation are performed, results are compared and an accuracy of 96.51% obtained. The method in [8], gave an automatic algorithm for detecting tumors in 3D Magnetic Resonance Image. Pre-processing methods used are Bias field correction and histogram matching, the feature learning is done using LBP-TOP (Local Binary Pattern in three orthogonal planes) and HOG- TOP(Histogram orientation of Gradient). LBP is superior in texture feature detection and HOG is used for object detection. Random Forest classification is used for Tumor classification. In the paper [34], the authors give a detailed description of feature extraction using GLCM properties and the method gives excellent performance for axial, coronal and sagittal views of brain MRI images.

Features Methods	Papers
5 salient feature mass effect, Anatomical location, Density, Contrast enhancement and Boundary	[11]
Texture features and VOI features	[12]
Contour matching	[13]
Gabour wavelet Filter	[14],[21], [7]
CMRGIc texture feature with volumetric co-occurrence matrices	[15]
3D curvelet transform (DcVT)	[16]
3D Grayscale level Co-occurrence Matrices (3D GLCM)	[17], [20], [25], [27], [29]
3D Local Binary Pattern (LBP)	[17], [25], [7], [8]
3D Wavelet transform	[17]
3D Gabor transform	[17],[18]
Shape features	[19]
Laplacian of Gradient (LOG), Directional Gabor texture feature (DGTF), Rotational Invariant Circular Gabor Features (RICGF), Rotational Invariant Local Binary Pattern (RILBP) Intensity Based Features (IBF)	[22]
3D SIFT descriptors	[23]
GLCM	[24], [7], [28], [33], [34]
SOP(Second order pyramid)	[25]
Gray Level Run Length Matrix(GLRLM),	[7], [28]
Histogram of Gradient(HOG)	[7], [8]
Guassian Mixture Model (GMM)	[30]
MGLCM (Modified Gray level coo- occurrence matrix)	[31], [32]

Table I.

VI. CONCLUSION

Now a days Image retrieval is becoming more challenging in web data mining applications. The millions of image are available in web database, so retrieving images from these large database become more complex. 3D Content Based Image Retrieval has become extremely active research area for the last decade. The important steps in the construction of any Image retrieval system is to find the correct features to represent images, as well as a similarity metric that groups visually similar images together. Therefore the images have to be indexed according to their own features such as color, texture shape or any other feature or a combination of set of visual features. This paper discussed some of the feature extraction methods applied on 2D and 3D Magnetic Resonance Images (MRI) of Human Brain databases and tabulated their average retrieval precision from the database.

VII. REFERENCES

[1] Azhar Quddus and Otman Basir. Semantic image retrieval in magnetic resonance brain volumes. IEEE transactions on information technology in biomedicine (2012) pp. 348-354.

[2] P.S. Shijin Kumar, V.S. Dharun, A study of MRI segmentation methods in automatic brain tumor detection, Int. J. Eng. Technol. 8 (2016) pp. 609-614.

[3] Geethu Mohan, M. Monica Subashini, MRI based medical image analysis : Survey on brain tumor grade classification, Biomedical Signal processing and control 39(2019) pp. 139- 161.

[4] E. Abdel-Maksoud, M. Elmogy, R. Al-Awadi, Brain tumor segmentation based on a hybrid clustering technique, Egypt. Informatics J. 16 (2015) pp. 71-81.

[5] Loizou C, Pantziaris M, Seimenis I, Pattichis S. Brain MR image normalization in texture analysis of multiple sclerosis. In: 9th IEEE international conference on information technology and applications in biomedicine, (2009) pp. 1-5.

[6] C. C. Benson andV. L. Lajish, Morphologybased enhancement and skull stripping ofMRI brain images,in Proceedings of the International Conference on Intelligent Computing Applications (ICICA '14), (2014) pp. 254-257.

[7] N. Nabizadeh, M. Kubat, Brain tumors detection and segmentation in MR images: gabor wavelet vs statistical features, Comput. Electr. Eng. 45 (2015) pp. 286-301

[8] S.Abbasi, F.Tajerpour, Detection of Brain tumor in 3D MRI images using local binary patterns and histogram orientation gradient Neurocomputing 219(2017) pp. 526-535

[9] L. Paulhac, P. Makris, Jean-Yves Ramel, "Comparison between 2D and 3D Local Binary Pattern Methods for Characterisation of Three-Dimensional Textures", International Conference Image Analysis and Recognition (2008), pp. 670-679

[10] Zhou, Xiang Sean "Image retrieval: Feature primitives, Feature representation and relevance feedback", 2000 proceedings Workshop on Content based image and video libraries,IEEE (2000), pp. 10-14

[11] Xiaohong Gao, Yu Qian, Martin Loomes, Richard Comley, Balbir Barn, "Retrieval of 3D Medical Images via Their Texture Features", International Journal on Advances in Software, 2011, pp. 499-509.

[12] Yong Li, Xiujuan Chen, Saeid Belkasim and Yi Pan, "Parallel Contour Matching and 3D Partial Retrieval in Bio- image Database", 21st International Conference on Advanced Information Networking and Applications Workshops, 2007.

[13] Xiaohong Gao, "Feature wise representation for both still and motion 3D medical images ", IEEE South-west Symposium on Image Analysis and Interpretation (SSIAI), 2014

[14] Leila C. C. Bergamasco, Rafael A. P. Oliveira, HarryNow a days Image retrieval is becoming more challenging in web data mining applications. The millions of image are available in web database, so retrieving images from these large database become Wechsler, Cainã Dajuda, Márcio Delamaro, Fátima L. S. Nunes, "Content-Based Image Retrieval of 3D Cardiac Models to Aid the Diagnosis of Congestive Heart Failure by Using Spectral Clustering", IEEE 28th International Symposium on Computer-Based Medical Systems, 2015, pp. 183-186.

[15] Shuzhao Dong, Kaikun Dong, Lu Yin, "The Application of Local Structure Classification in Content-based 3D Medical Image Retrieval", IEEE Seventh International Conference on Image and Graphics, 2013, pp. 639-642

[16] Sidong Liu, Weidong Cai, Lingfeng Wen, Stefan Eberl, Michael J Fulham, Dagan Feng, "Localized Functional Neuroimaging Retrieval Using 3d Discrete Curvelet Curvelet Transform", IEEE International Symposium on Biomedical Imaging: From Nano to Macro, 2011 pp.1877-1880

[17] Weidong Cai , Sidong Liu, Lingfeng Wen, Stefan Eberl, Michael J Fulham, Dagan Feng, "3D neurological image retrieval with localized patholo-gycentric CMRGLC patterns", Proceedings of 2010 IEEE 17th International Conference on Image Processing, ICIP, 2010, pp. 3201-3204.

[18] Sidong Liu, Weidong Cai, Lingfeng Wen, David Dagan Feng, "Multiscale And Multiorientation Feature Extraction With Degenerative Patterns For 3d Neuroimaging Retrieval", 19th IEEE International Conference on Image Processing (ICIP), 2012, pp. 1249-1252.

[19] Hao Wu, Jinmall Kim, Weidong Cai, David Dagan Feng, "Volume Of Interest (VOI) Feature Representation And Retrieval Of Multi-Dimensional Dynamic Positron Emission Tomography Images", Proceedings of 2004 International Symposium on Intelligent Multimedia, Video and Speech Processing, 2004, pp. 639-642

[20] Hasan, A, Meziane, F , Aspin, R and Jalab, HA 2016, "Segmentation of brain tumors in MRI images using three- dimensional active contour without edge" , Symmetry in Complex Networks II, 8 (2016), p. 132.

[21] Ali M. Hasan ,Farid Meziane, "Automated screening of MRI brain scanning using grey level statistics", Computers and Electrical Engineering, Vol: 53, Page: 276-291, 2016

[22] Maani R, Yang Y,H, Kalra S "Voxel-Based Texture Analysis of the Brain", PLoS ONE 10(3):e011759. https://doi.org/10.1371/journal.pone.0117759(2015)

[23] Natteshan N.V.S., Angel Arul Jothi J. "Automatic Classification of Brain MRI Images Using SVM and Neural Network Classifiers". In: El-Alfy ES., Thampi S., Takagi H., Piramuthu S., Hanne T. (eds) Advances in Intelligent Informatics. Advances in Intelligent Systems and Computing, vol 320.(2015) Springer, Cham

[24] Y. Liu, T. Kanade and W. E. Rothfus, "Content-based 3D Neuroradiologic Image Retrieval: Preliminary Results," Proceedings of the 1998 International Workshop on Content- Based Access of Image and Video Databases (CAIVD '98), 1998, pp. 91-100.

[25] Rahim, M.S.M., Saba, T., Nayer, F. et al. 3D Res (2014) 5: 3. https://doi.org/10.1007/s13319-013-0003-2

[26] Andrés Ortiz, Antonio A. Palacio, Juan M. Górriz, Javier Ramírez, and Diego Salas-González, "Segmentation of Brain MRI Using SOM-FCM-Based Method and 3D Statistical Descriptors," Computational and Mathematical Methods in Medicine, vol. 2013, Article ID 638563, 12 pages, 2013. https://doi.org/10.1155/2013/638563.

[27] Narbada Jhalwa1, Payal Shah, Rajendra Sutar, "A Hybrid Approach for MRI Based Statistical Feature Extraction to Detect Brain Tumor", IOSR Journal of VLSI and Signal Processing (IOSR-JVSP),Volume 8, Issue 2, Ver. I (Mar.- Apr. 2018), PP 30-37

[28] Maani R, Yang YH, Kalra S "Voxel-Based Texture Analysis of the Brain", PLoS ONE 10(3): e0117759. https://doi.org/10.1371/journal.pone.0117759 (2015)

[29] Maani R, Kalra S, Yang YH (2014) Robust Volumetric Texture Classification of Magnetic Resonance Images of the Brain Using Local Frequency Descriptor. IEEE Trans Image Process 23:4625–4636. PMID

[30] Nilesh Bhaskarrao Bahadure, Arun Kumar Ray, and Har Pal Thethi, "Image Analysis for MRI Based Brain Tumor Detection and Feature Extraction Using Biologically Inspired BWT and SVM," International Journal of Biomedical Imaging, vol. 2017, Article ID 9749108, 12 pages, 2017. https://doi.org/10.1155/2017/9749108.

[31] A. Chaddad, "Automated feature extraction in brain tumor by magnetic resonance imaging using gaussian mixture models," International Journal of Biomedical Imaging,vol.2015, Article ID 868031, 11 pages, 2015

[32] Jun Jiang, Yao Wu, Meiyan Huang1, Wei Yang1, Wufan Chen and Qianjin Feng, "3D brain tumor segmentation in multimodal MR images based on learning population- and patient-specific feature sets", Computerized Medical Imaging and Graphics Volume 37, Issues 7–8, October–December 2013, Pages 512-521.

[33] D. Cobzas, N. Birkbeck, M. Schmidt, M. Jagersand and A. Murtha, "3D Variational Brain Tumor Segmentation using a High Dimensional Feature Set," 2007 IEEE 11th International Conference on Computer Vision, Rio de Janeiro, 2007, pp. 1-8.

[34] Sachdeva, J., Kumar, V., Gupta, I. et al., "Segmentation, Feature Extraction, and Multiclass Brain Tumor Classification", J Digit Imaging (2013) 26: 1141. https://doi.org/10.1007/s10278-013-9600-0

Graphic Design on Packaging for Image Presentation of Phranakhorn SI Ayutthaya

[1] Kamonwanmalijai, [2] Suppawanpankohlerng, [3] Piyawanpinkaew, [4] Cheewinchinnadeloakvanich

[1,2,3,4]Faculty of Industrial Technology, SuanSunandhaRajabhat University

E-mail :[1]S58122518031@ssru.ac.th, [2]suppawan.pa@ssru.ac.th, [3]piyawan.pi@ssru.ac.th, [4]cheewin.ch@ssru.ac.th

ABSTRACT

Research on graphic design on packaging to present the image ofAyutthaya which is the old capital and Thai historical park was registered as a UNESCO World Heritage Site under the name of "Ayutthaya Historical City and Acropolis". Therefore, it is a major tourist province of Thailand. Each community also has products that are unique to the community sold to tourists,but the product does not offer the overall image of the product in Ayutthaya Province. The researcher, therefore, sought a graphic design approach on the packaging to present the image of Ayutthaya. The research objectives are 1)To study the identity of Ayutthaya. 2)To study the products of Ayutthaya. And, 3) To study graphic design on packaging to present the image of Ayutthaya by conducting research on the number of people living in Ayutthaya both males and females aged 20 years by accidental sampling method. Research results are 1)Obtainedthe identity of Ayutthaya. Sample group responded to the questionnaire when talking about Ayutthaya, 86% of the historical sites. 2)Obtained the products that are famous and unique in Ayutthaya, 92 percent ofRotiSaimai, 84 percent of bamboo fan, 62 percent of grilled fish, 58 percent loincloth and 42 percent of ground grilled fish.3) Have designed graphicon the packaging using the image of Ayutthaya as an archaeological site. Graphic design experts have the desire to use an ancient style with realistic illustrations 42.9 percent, color pairs and opposite 71.4 percent. The researchers used the graphic design on the packaging to present the style of Ayutthaya.

Keywords - Graphic Design, Packaging, Identity, Image

I. BACKGROUND AND IMPORTANCE OF THE PROBLEM

PhraNakhon Si Ayutthaya Province or in short, "Ayutthaya", is located in the central region, and is the old capital and Thai historical park. This was registered as a UNESCO World Heritage Site under the name of "Ayutthaya Historical City and Acropolis". At the 15th World Heritage Committee meeting in 1991 at Carthage, Tunisia And the Thai Fine Arts Department announced the registration of ancient monuments, which are important heritage of Thailand that still symbolizes the glory of the past. Therefore, this is a major tourist province in Thailand. In addition, each community has products that are unique to the community sold to tourists, but the product does not offer the overall image of the product in PhraNakhon Si Ayutthaya Province which is a province with a unique identity and historical sites of Thailand. The researcher therefore saw the importance of graphic design on packaging to present the image of PhraNakhon Si Ayutthaya. Giving the product a consistent image in PhraNakhon Si Ayutthaya Province will be a way to present the image of the province to both Thai and foreign tourists.

II.OBJECTIVES

1. To study the identity of PhraNakhon Si Ayutthaya.
2. To study the products of PhraNakhon Si Ayutthaya.
3. To design graphic on packaging to present the image of PhraNakhon Si Ayutthaya.

III. METHODOLOGY

1. Population and sample group

Population in this study is general people who live in PhraNakhon Si Ayutthaya Province.

The sample group of this study is the target group of general people who live in PhraNakhon Si Ayutthaya Province, 50 people, both male and femaleage 20 years by accidental sampling method.

2. Tools for data collection

Questionnaire set 1 for consumer tastes. There are 50 sets of data collected from the sample group inquiry.

The second set of questionnaire on graphic design on the package has 7 sets of data collected from the questionnaire of 7 graphic design experts by purposive sampling method.

3. Data type

Primary data from the questionnaire. The researcher conducted the data collection.

Secondary data Collect data from the theory. In addition, the researcher has studied from the literature and applied the Thai color tone theory to be used in graphic design on packaging to present the image of PhraNakhon Si Ayutthaya.

4. Data analysis

Information about general conditions and consumer tastes of respondents such as gender, age, monthly income and taste.

General condition	number (people)	percentage
1. sex		
- Male	15	30
- Female	35	70
2. Age		
- Less than 20 years	0	0
- 20-30 years 21	21	42
- 31-40 years 3	3	6
- 41-50 years	8	16
- 51 years or more	18	36
3. Income		
- Less than 10,000 baht / month	13	26
- 10,000 - 20,000 baht / month	12	24
- 20,000 baht / month or more	25	50

Table 1 Information about the general condition of the sample of 50 people

Consumer taste	Number (person)	Percentage
archaeological site	43	86
River lobster	4	8
Woven fish	2	4
BuppheSanniwasDrama	1	2

Table 3 The percentage of questionnaires on consumer tastes 5 famous products in PhraNakhon Si Ayutthaya from 10 things

Product	Number (people)	Percentage
RotiSaimai	46	92
Weave wood fans	42	84
Grilled fish	31	62
loincloth	29	58
Grind grilled fish	21	42

Table 2 Information about consumer tastes of the sample group when talking about PhraNakhon Si Ayutthaya, about 50 people

Data analysis of graphic design experts on packaging presents the image of PhraNakhon Si Ayutthaya.

Graphic design,	Number (person)	Percentage
Illustration in realistic painting	3	42.9
Opposite color	5	71.4

5. Statistics used in research
5.1 Accumulation
5.2 percent

Table 4 Number of experts in graphic design on 7 people

IV. RESULTS

1. Obtained the identity of PhraNakhon Si Ayutthaya sample group responded to the questionnaire when talking about Ayutthaya, 86% of the historical sites.
2. Obtained the famous and unique products of PhraNakhon Si Ayutthaya which are 92% of RotiSaimai, 84% of woven bamboo fans, 62% of grilled fish, 58% of loincloth, and 42% of grind grilled fish.
3. Have designed graphic on the packaging using the image of Ayutthaya as an archaeological site. Graphic design experts have the desire to use an ancient style with realistic illustrations 42.9 percent, color pairs and opposite 71.4 percent. The researchers used the graphic design on the packaging to present the style of Ayutthaya.

V. DISCUSSION AND CONCLUSION

From the study of graphic design on packaging to present the image of PhraNakhon Si Ayutthaya, summarizing and discussing the results are as follows:

1. Graphic design on packaging to present the image of PhraNakhon Si Ayutthaya in the form of graphics on the packaging is found that the identity of PhraNakhon Si Ayutthaya Provincesample responded to the questionnaire when talking about Ayutthaya, historical sites 86%, and graphic design professionals have the need to design graphics on the packaging using a realistic illustration which corresponds to the past history of the ancient remains that remain today.
2. Famous and unique products of PhraNakhon Si Ayutthaya from respondents' questionnaires on consumer tastes which are 92 percent of RotiSaimai, 84 percent of woven bamboo fans, 62 percent of grilled fish, 58 percent of loincloth and 42 percent of grind grilled fish, to bring the products to be designed for graphics on the packaging to present the image of PhraNakhon Si Ayutthaya.
3. Graphic design on packaging to present the image of PhraNakhon Si Ayutthaya. Graphic professionals have the need to design graphics on the packaging using a realistic illustration of 42.9 percent, color pairs and opposite 71.4 percent. The researcher used the Thai color tone theory to use in graphic design on packaging to present the image of PhraNakhon Si Ayutthaya in the same direction.

Examples of graphic works on packaging are as follows.

Figure 1 graphic sample on roti packaging

Figure 2: Graphical examples of bamboo sticks packaging

Picture 3 Sample graphic on grilled fish packaging

Figure 4: Sample graphic on loincloth packaging

Picture 5 Sample graph on grilled fish food packaging

VI. SUGGESTION

From literature studies of PhraNakhon Si Ayutthaya, there are also ancient temples and river tourism and this is a province with many rivers converging including Chao Phraya River, Pa Sak River and Lop Buri River. This research can continue to extend this research to publicize the travel of temples, ancient monuments and ships.

REFERENCE

[1] Freshwater fish processing community enterprise group. 12 December 2018. Source:https://is.gd/lUHs5

[2] Tourism Authority of Thailand And a bottle of dot com (2013). Travel to Ayutthaya, learn 9 temples with a long history. 17 August 2018. Source: https://is.gd/qAooYh

[3] The motto of PhraNakhon Si Ayutthaya(2013) 28 March 2018 Source:https://1th.me/qCEJ

[4] Chao Noi (2017), known for graphic design on packaging, November 20, 2018 Source:https://is.gd/Okr BEm

[5] ChatchaiMuksong (2000) PhraNakhon Si Ayutthaya Nonthaburi: SPP Printing Group Company Limited.

[6] ChaiyaratSomchun (2012) Bamboo Fiber Scrub Ban Pak Kran OTOP Thai .. One in the world December 12, 2018 Source: https://is.gd/HC7ZpK

[7] Thong LuekKhet Thong (1999). Symbol design. Bangkok: Siprapha Publishing

[8] Miss KwanjaiSookkun, Miss NamfonLookKham and Miss BannasornSanthan (2012). Designing the logo of the packaging of Thai clay of the artificial clay work group Nonthaburi. SuanSunandha Rajabhat University

[9] PhairotPhittayametee (2561). Thaitone, Thai tone color "Thai tone identity ... Know it, not trend" (Online). 29 September 2018. Source: https://1th.me/GOQO

[10] WatPloysri, (2013). The Study of Colour Values on Paper from Offset Printing, 16 April 2018. http://ww w.ssruir.ssru.ac.th/bitstream/ssruir/599/1/003-55.pdf

[11] WichanatTiwasingha (2015). Graphic design for the development of folk textile products in Mahasarakham Province. Faculty of Architecture, Urban Planning and Creative Arts. Mahasarakrmuniversity

[12] ViranyaKram, TheerachaiPlengchai, SunisaAree Mitphon, PreeyapatsChantarisil and Budsaba Thepburi. Roti Sai - (Rotisaimai) .12 December 2018. Source: https://is.gd/4YvSjx

[13] SiripornKornsawan (2015). Illustration style. 28 March 2018. Source: https://1th.me/A13x Office of PhraNakhon Si Ayutthaya Province.

[14] OTOP. 12 December 2018. Source: https://is.gd/VQMoBxProvincial Community Development Office

[15] PhraNakhon Si Ayutthaya (2016). One Tambon One Product (OTOP). December 12, 2018. Source: https://is.gd/dvI5dD

[16] AmonratBoonswang (2016). Brand and packaging design To promote unique food products of the southern border provinces. Department of Fine Art Program Design. Faculty of Arts. Songkhla Rajabhat University Songkhla

[17] PrasarnSathienpan. Blowing Ban Phraek. December 12, 2018. Source: https://bit.ly/2HYtdde

[18] John Mcwadw (2013). Before & After: How to design cool stuff.Bangkok: TrueLifenpantong. Ayudhya cloth. December 12, 2018. Source: https://bit.ly/2CWYd9r oknation, bangkokgraphic.

[19] CORPORATE IDENTITY - Corporate Identity. 20 November 2018. Source: https://is.gd/NciQmn

[20] PavanaChaisomboon (2006). Publication illustrations. 28 March 2018. Source:https://1th.me/UvE7 phachi (2017). Ban NongKruaboon Community Enterprise Group. 12 December 2018. Source: https://is.gd/zl8gPO

Development of A Mobile Application for Studying Physics using Augmented Reality Technology

[1] Ye. A. Daineko, [2] M. T. Ipalakova, [3] D. D. Tsoy, [4] Zh. B. Baurzhan, [5]Ye. K. Yelgondy, [6] Zh. Zh. Bolatov, [7] A. M. Seitnur

[1,2,3,4,5,6,7]International Information Technology University

1Institute of Applied Sciences and Information Technologies, Almaty, Kazakhstan

E-mail: [1]yevgeniyadaineko@gmail.com

ABSTRACT

This article discusses the relevance of the use of mobile applications in the organization of the educational process in technical universities. There are own training developments using new information technologies. The conclusions about the use of new technologies in the study of physics are provided.

Keywords - Physics, Augmented Reality, Education, Virtual Physical Laboratory, Unity.

I. INTRODUCTION

Today it is difficult to imagine our life without information technologies (IT). They become an important part of our daily life, greatly simplifying some of its moments. Moreover, this integration is increasing day by day. With the development of IT, we are gaining access to an ever-increasing number of new tools that speed up, reduce the cost and make some everyday processes more convenient. These are mobile devices and tablets.

Mobile technologies have steadily entered our lives. They dramatically improve both production processes and information consumption processes. The use of mobile technology allows to be aware of all the events in the world, making for this a minimum of effort. In education, the prospects for the use of mobile technologies are broad, ranging from mobile applications to the organization of the learning process, to applications used specifically in the framework of subjects. So, for the development of new methods of teaching using mobile technologies, recently augmented reality has been actively used, which allows visualizing various objects, phenomena and processes by introducing virtual components into the real environment.

It is known that the human brain is more able to processing visual images than plain text. There are many studies on this topic [1, 2], which show that the technologies of augmented reality in the field of education enrich visual and contextual learning, improving the content of information. If, while listening to lectures, 25% of information is retained in short-term memory, then with visual training it is 80%. In this regard, it can be noted that the use of training systems with elements of augmented reality at any level of education will positively affect the learning and understanding of the material by students.

In Kazakhstan, the International Information Technology University, which is the leader in Central Asia in training highly qualified, internationally recognized IT experts for the region, has extensive experience in developing software applications using new technologies. For example, in the discipline "Physics" classes are conducted using augmented and virtual reality technologies. Additional training tools such as virtual labs, 3D animations, educational mobile applications developed by university teachers and students are used.

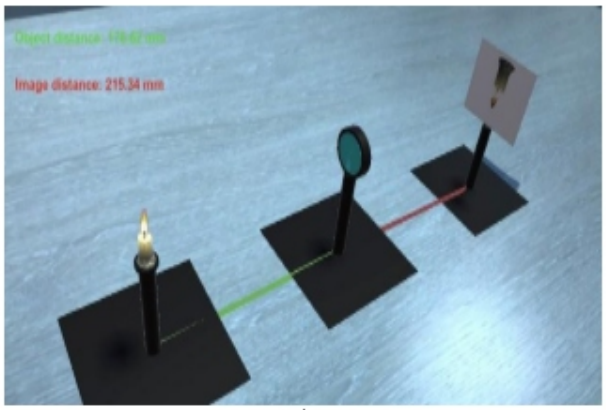
For example, a virtual laboratory consists of laboratory work in such areas of physics as mechanics, dynamics, thermodynamics, hydrodynamics, electricity and magnetism, optics, atomic and quantum physics [3, 4]. This complex works in three languages (Kazakh, Russian, English), contains a theoretical description, a virtual experiment and a test of knowledge with multiple choice answers.

The developed mobile application for the courses “Physics-1” and “Physics-2” is implemented for devices running the iOS operating system and allows to study the theory of laboratory work, the experimental setup scheme, test knowledge by answering questions, communicate with the teacher via chat, and also have access to social networks Another development is an electronic textbook, which is an additional material for self-study students of the discipline "Physics". This textbook presents theoretically material, tasks, tests, video tutorials and animations. Thanks to the use of hypertext, an electronic textbook reduces the time for searching and learning educational material at times. The electronic textbook also contains thematic and training tests for self-control. A feature of the developed electronic textbook is the regular update of its content and test questions.

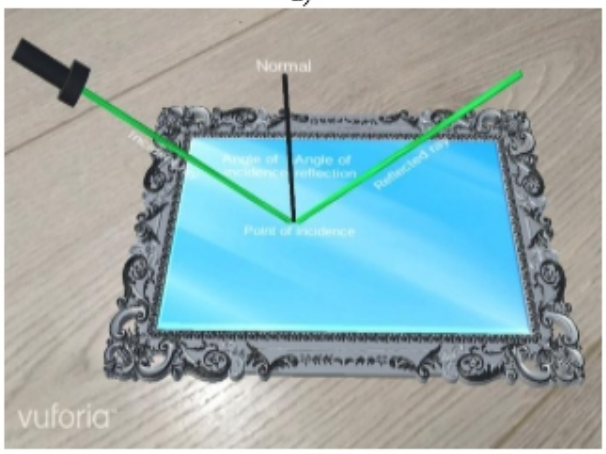
This article presents a mobile application using augmented reality technology to study physics. The virtual laboratory developed by the authors allows solving problems and observing the course of the experiment when changing the initial parameters, performing laboratory work, watching animations and testing knowledge with the help of test questions.

II.RESULTS

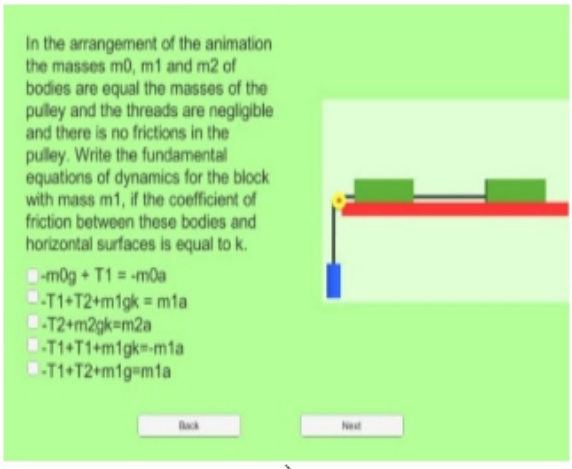
Figure 1 shows a mobile application using augmented reality technology with a set of practical tasks, experiments, animations and test questions in physics. The user is given the opportunity to move in the task space and observe its imitation from any positions or viewing angles, which in turn improves the perception and assimilation of the studied material. Such an application of augmented reality has a positive effect on the motivation, attention, concentration and discipline of students. It is also possible to test knowledge using tests with multiple choice answers.



a)



b)



c)

Figure 1 - Example of a mobile application using augmented reality technology (a) laboratory work, b) animation, c) test

As a software environment, a graphical tool was used to develop three-dimensional Unity3D applications [6], which is a cross-platform computer game development environment from Unity Technologies. It allows you to create virtual reality applications running on personal computers, mobile devices with iOS and Android operating systems, in Internet applications. Unity Editor has a simple Drag & Drop interface that is easy to configure, consisting of various windows, so you can debug the game directly in the editor. The engine supports two scripting languages: C #, JavaScript. Physical calculations are made by the PhysX physics engine from NVIDIA.

As a library for the implementation of the functions of augmented reality, the Vuforia library [7] was chosen due to qualities such as crossplatform, free work, tracking of 3D objects, visual search. The Vuforia library makes it easy to scan targets with the integrated Vuforia Object Scanner. It is also possible to enable virtual buttons and map additional elements using OpenGL. Cross-platform allows you to work on different platforms, which means a wider audience coverage and usability of the program.

In general, the operation of the application can be described using the following UML diagrams. The application consists of the components shown in Figure 2. It shows the structure of the application. The main component is the Main Launcher, which launches the camera and many scripts necessary for the application to work. The scripts are located in the Assets component, where you can also find models, prefabs, and other necessary resources.

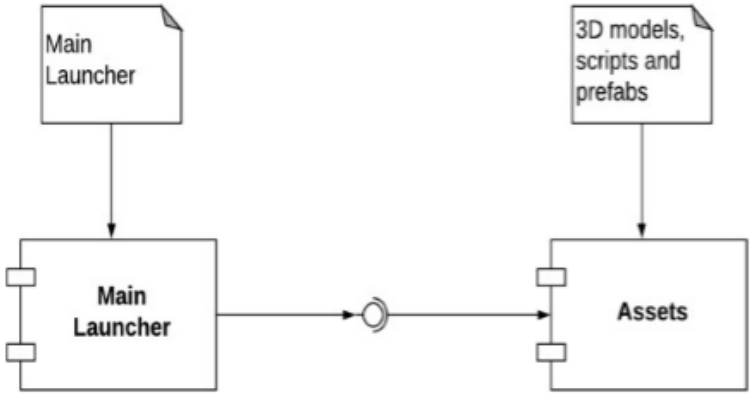


Figure 2 - Component Diagram

An example of user interaction with an application can be described by the example of performing a virtual laboratory work “Determining the focal length of a thin lens”. The use case diagram in Figure 3 describes the possible actions taken by the user. Three markers are required to complete this lab. When they are seen in the visibility zone of the camera, the following three-dimensional objects will be built on the screen of the mobile device: lens, candle, white paper. Depending on the location of each marker, the application draws an image of a candle through the lens on a virtual paper object. The distance x from the object to the lens and y from the lens to the reflection will also be displayed on the screen. As the marker moves, the x and y values, as well as the marker display, will change in real time.

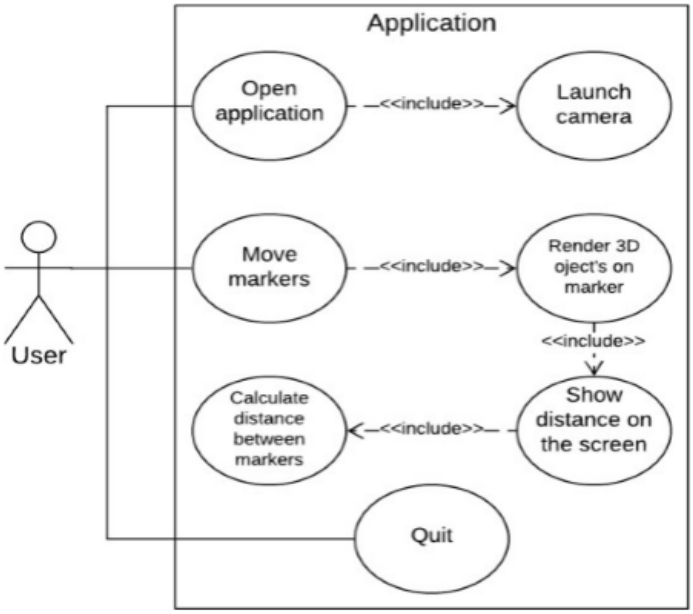


Figure 3 - Case Chart

Thus, when performing this virtual laboratory work, the user is given the opportunity to study the image building process, check the thin lens equation and independently carry out the calculation to determine the magnification of the resulting image.

III. CONCLUSION

Many foreign researchers call the technology of augmented reality one of the main trends in education in the next decade; therefore, domestic universities and schools should not stand aside. Today, the technology of augmented reality in education is at the stage of formation, therefore, analyzing foreign and already existing domestic experience, it is necessary to actively implement them in educational processes at all levels. Currently, the authors are constantly working to expand the functionality of the developed mobile application in the direction of creating new virtual laboratory works and physical animations and integrating them into the laboratory.

ACKNOWLEDGMENTS

The work was done under the funding of the Ministry of Education and Science of the Republic of Kazakhstan (No. Ap05135692).

REFERENCES

[1] Wu H. K. et al, "Current status, opportunities and challenges of augmented reality in education," Computers & Education, vol.62, pp. 41-49, 2013

[2] A.M. Kamarainen et al, "EcoMOBILE: Integrating augmented reality and probeware with environmental education field trips," Computers & Education, vol. 68, pp 545-556, 2013

[3] Y. Daineko, V. Dmitriyev, M. Ipalakova, "Using Virtual Laboratories in Teaching Natural Sciences: An Example of Physics," Computer Applications in Engineering Education, vol. 25, pp. 39-47, January 2017
[4] Y.A. Daineko, M.T. Ipalakova, Zh.Zh. Bolatov, "Employing information technologies based on .NET XNA framework for developing a virtual physical laboratory with elements of 3D computer modeling," Programming and Computer Software, vol. 43, pp. 161-171, May 2017
[5] M. T. Ipalakova, V. V. Kisselyov, E. S. Kostandyan, E. R. Khassanov, "The development of the e-learning resources using the technology of virtual reality," III International Conference «Digital Technologies in Science and Industry - 2017» Almaty, Kazakhstan, pp. 566-572, 19-20 May, 2017
[6] https://unity3d.com/company
[7] https://www.vuforia.com/

2 D Animation Design Title: be Proud of Your Bodies

[1]Waroonsriwongsuwan, [2]Kwanchaisukkon, [3]Nataonputtawong, [4]Piboolwaijittragum

Faculty of Industrial Technology, SuansunandhaRajabhat University

E-mail: [1]s59122525073@ssru.ac.th, [2]Khwanchai.su@ssru.ac.th, [3]nataon.pu@ssru.ac.th, [4]pibool.wa@ssru.ac.th

ABSTRACT

This study aims to create girl's self-esteem for their bodies, according to Courtney Ackerman' s study that collected information and guidelines for women to feel proud of themselves, although they have put on weight. Therefore, an animation created from this study should be interesting and communicative. The output of this study is a 2 D animation collected data from questionnaire and case studies. The results found that the target group prefer animation with 2-3 minutes long. They like the illustration with outline and they prefer a realistic proportion characters. The content will be positive and relaxing. The design guidelines found that; Medium shot of camera angle is mostly used. The sound effect background is music. The story sequences start from the beginning until the end respectively. The color tone is a mixture of tones.

I. INTRODUCTION

Lately Thai teenagers give a high value on the looks of body. This is more likely to bring a bad attitude and bad judgement on people's bodies. Girls could be not accepted if they don't have the bodies that match the value. A lot of teenager's problems may be too difficult to understand or to find a solution. As a result, they become lack of confidence due to low self-esteem toward their bodies.

People with low self-esteem have a negative feeling and a bad attitude towards themselves. They would think that they are worthless, lonely, unlovable and incompetent. This kind of people can't focus on work or study. Moreover, they can't confront any problem, awkward and have no will to do anything. Consequently, this affects the quality of life in many ways. In contrast, people with self-esteem have a positive feeling. They like and appreciate themselves.So people with healthy self-esteem are more likely to be happy and successful since they believe that they will achieve their goals. Therefore, self-esteem has a significance role in one's motivation and success. (Cherry. K. 2019).

Consequently, there are many studies on this issue. Including Courtney Ackerman, who has collected related research 'results aim to find the solutions and guidelines to change a bad attitude about one self's body. She suggests many approaches to feel better and become more positive to the body. Her work could be a content guideline for a 2 D animation that aims to form up a good attitude for teenagers who have low self-esteem about their bodies, so that they will have a positive feeling, be proud of their bodies and most of all is to have a quality life.

II.OBJECTIVES

1. To design a 2 D animation title: Be proud of your bodies.
2. To encourage teenagers to have positive feeling about their bodies.

III. METHODOLOGY

1. Study information and related studies about 2 D animation.
2. Create the research's tools: questionnaire and case study form.
3. Collect data from target group 100 persons
4. Collect data from 15 case studies.
5. Analyze the data collected from the target group. Using basic statistic, that are percentage (%) MEAN and interpret the content from 15 Case study . These analysis result will be a design brief and it will match with the target group's interests.
6. Design the 2 D animation title: Be proud of your bodies.

IV. RESULTS

The resuts collected from the target group, that are students 100 persons, divided into 2 parts; the target group's beheaviors and the target group's preference. The results are as follow;

Part 1 The target group's attitude and the interests.

The cause	MEAN	order
People surrounded, ex; freinds	3.9	1
Their thought, ex; compare themselves with the other people.	3.5	4
Social media	3.64	2
Other media	3.58	3
MEAN	5	

Table 1 The reason that make them not feeling positive about their bodies. The result found that it is because of the people surrounded that teasing or giving a critique.

Content	Number	Percentage (100%)	order
Positive and Relaxing	28	56	1
Comedy	17	34	2
Drama	3	6	3
Romantic	2	4	4
total	50	100	

Table 2 The content interests found that the target group prefer the content that is positive and relaxing

Duration	number	Percentage (100%)	order
2 – 3 minutes	27	54	1
4 – 5 minutes	19	38	2
6 minutes or more	4	8	3
total	**50**	**100**	

Table 3 The animation's duration that the target prefer. It is found that they prefer 2-3 minutes long.

The illustration style	Number	Percentage (100%)	order
With outline	45	90	1
Without outline	5	10	2
Mix	-	-	-
total	**50**	**100**	

Table 4 The illustration style that the target group prefer. The result found that they prefer the illustration with outline.

Character's Proportion	Number	Percentage (100%)	order
Realistic Proportion	36	72	1
SD Proportion	8	16	2
The head is bigger than the body proportion	6	12	3
total	**50**	**100**	

Table 5 The character proportion preference. The result found that they prefer the realistic proportion.

Part 2 case study analysis. It is found that most of the cases are emotional contents and very imaginative. The illustration is drawing type of illustration. The character proportion is realistic. The background is simplified. There are many camera angles and medium shot is mostly used. The sound effect background is music so that the audiences would focus more on the content and the illustration. The story sequences start from the beginning until the end respectively. The color tone is a mixture of tones.

Design output

The design brief created from the result analysis that collected from the target group. So the design will

match the target group's interests and preference. The output of this study is a 2 D animation with the design concept: Change your attitude. It intends to communicate to the target group to change the way they think so that they would feel positive and proud of their bodies. The mood and tone using for the

design are Romantic, Gentle and Cool. The target group is female student age 19-22 years old. They don't have a positive feeling about their bodies. The animation will interest the target group because of the new style of design.

The design procedure is as follow;

1. Analyze and conclude the results
2. Sketch story board and color the characters.
3. Develop the story board, characters, background music, camera angles and animate.

Figure 1 : Story board's Sketch

Figure 2 :The characters development

V. CONCLUSION AND DISCUSSION

This 2 D animation title: Be proud of your body, aims to communicate to female students, age 19-22 years old who don't have a positive feeling about their bodies. The design encourage them to become more positive and become proud of their bodies. The content is easy to understand and enjoyable. It has mood and tone that match the target group's interests. The story content is concluded from Courtney Ackerman's study. It is a good guideline to bring a positive feeling and give many advices to the audiences. Therefore, the target group will enjoy this 2 D animation and take the advices to feel proud of their bodies.

For a further study could take this content to be a guideline to design another type of media. Otherwise, a study could focus on different type of low-self- esteem, in order to bring positive feeling to the people who have the problem to have a quality of life.

ACKNOWLEDGMENT

The researchers would like to thank many people for the help and advice. This research can't be accomplish without the help of family and friends. Also we are appreciated the support from the faculty of Industrial Technology, Suan Sunandha Rajabhat University.

REFERENCES

[1] Boontan.T.(2015) The basic of Animation 2D.Retrieved 10 th December, 2018. From www.slideshare.net /thanawatboontan/animation-2d-

[2] Courtney Ackerma(2561) 3 Positive Body Image Activities & Worksheets.Retrieved 2 nd December 2018. From www.positivepsychologyprogram.com/positive-body- image/

[3] Ketman. N. (2009) Teenagers. Retrieved 10 th December, 2018. From

[4] www.psyclin.co.th/new_page_56.html

[5] Sittisak.P. (2 016) The foundation of 2 D animation.Retrieved 10 th December, 2018. From

[6] www.filmv.wordpress.com/unit

[7] Suathong.J. (2016) Handbook design guideline to promote attractions in Kudi-Jeen community for children. (Research, SuanSunandhaRajabhat University, Bangkok.

Making A 3D Animation Combined with History in Virtual Reality

[1] Tsung- Li Wang, [2] Ya- Fen Tseng
[1]Shu-Te University, Taiwan
[2]Chung Hwa University of Medical Technology, Taiwan
E-mail: [1]peterw@stu.edu.tw, [2]r3890102@gmail.com

ABSTRACT

In recent years, the virtual reality of the scene and interaction, not only can pick up the traditional art, reproduce the historical fragments, and bring a new artistic sensory experience different from the past. Nowadays, some virtual reality systems with the theme of historical preservation mostly use the way of guiding historical relics to let users watch or virtual touch the cultural relics. The lack of letting users experience the historical plot is like standing in front of historical figures to watch the evolution of historical facts. To this end, this study uses Taiwan's historical facts as a script to create animations and combines virtual reality somatosensory to let users experience the history of Taiwan. The virtual reality animation developed in this study allows users to participate in the process of historical events and play historical figures, and to observe the history of the history of different historical figures. The historical story in this virtual reality animation is built with 3D models and 360-degree surround animation. In order to complete the development of virtual reality animation, this study develops 3D model media in Taiwan's real history, including 3D terrain, buildings, 3D character models, 3D prop models and event animations, and physical environment construction. Finally, it will be published and displayed as a finished product.

Keywords - Virtual Reality, 360-Degree Surround Animation, Taiwan Historical Facts, Role Playing

I. INTRODUCTION

The past education model requires teachers and students to be in the classroom, and teachers to convey the knowledge of the students one-to-many. Such an education system is already deeply rooted. However, when students leave the school and walk into the workplace, they realize that their practical ability is quite scarce. It is caused by the fact that students usually passively listen to the lectures of teachers and lack the ability to learn and solve problems spontaneously. Therefore, many scholars advocate that the teacher-centered learning environment should be changed in the past, and students are encouraged to interact and communicate with each other in different ways to create a student- centered learning environment. With the maturity of virtual reality Virtual Reality (VR) technology, the method of breaking the traditional education system has gradually become clear. VR makes digital content more authentic and interactive than ever before. If the abstract curriculum concept can be combined with storytelling and even the evolution of events in the historical story, the attitude of students participating in various courses can be greatly improved. By designing a VR interactive experience textbook, it can be applied to students' learning, enhance their enthusiasm for learning, and drive the promotion of education. It is expected to explore the infinite potential of VR for education.

II.LITERATURE REVIEW

Although there are not many examples of domestic VR system and historical relics navigation, this research initially finds relevant applications in the near future, including the VR tour of the Kishu An Forest, the VR experience of the Forbidden City landscape painting, the VR experience of the Dunhuang Caves, and the VR city culture guide of Taipei City. View and Tamsui Historical VR tour. The description is as follows:

Kishu An Forest is the first cultural field in Taiwan that attempts to combine the local culture and heritage history with VR new technology. KKlabs collaborated with the city's historic site, Kishu An Forest, to bring VR into the historic site and reproduce the style of the restaurant during the Japanese occupation. When visitors visit the Kishu An Forest, they can experience the original VR interactive content combined with the historical and local history by using the SPOT VR glasses and smart phones.

The VR experience of the Dunhuang Caves is based on the VR system. Although the viewer is in a small physical space of two meters square, he can explore the spacious virtual caves. With a single glimpse, you can become a "flying sky" to soar in a virtual caves. If you want to stop and watch the murals in the middle of the flight, you can also press the "Time Freeze" button at any time. Solidify your body in midair and slowly appreciate the details of the mural.

Taipei City's "VR City Culture Guide", people wearing VR glasses, can enjoy four cultural venues as if they were on the scene. As long as you wear VR glasses, you can experience the venues such as Beitou Hot Springs Museum, SHIN HONG CHOON TEA CO. LTD, Zhongshan Hall Taipei College and Sun Yunyi Science and Technology Memorial Hall.The British Consulate in Fortress San Domingo City Park, using VR technology and interactive flight, can feel the fun of traveling with the hot air balloon and the famous Taiwanese celebrity "Dr. MacKay" from the sky to overlook the water's monuments and natural landscapes. When people wear the VR device, they can simulate the realism of taking the hot air balloon to the sky on the hills and historic sites on the shores of the Tamsui River, and experience the live flight. The Fort San Domingo, the former British consular bureau, and the customs terminal and the monuments such as the Tamsui Chapel, you can also watch the internal structure.

The above is a small part of the cultural navigation system presented at the present stage for the preservation of history and culture combined with the VR experience. These VR systems usually let the user experience by guiding the monuments and artifacts. Some VR systems, such as the Dunhuang Craves VR experience, provide virtual props that allow the experiencer to use virtual props such as

"Historical Recovery Searchlights" in the virtual space to provide feedback on historical artifacts in the space. In addition to the tour of historical relics, if the virtual space allows the experience to travel through time and space to interact with historical figures or historical facts, there will be a more vivid and more realistic experience. This is the function that this study has realized in the VR experience.

III. METHODOLOGY

This study combines historical events and characters into the VR experience, and allows the experiencer to play the characters in the historical facts to experience the people, things, and things that happened in history. This study uses VR somatosensory equipment combined with Zheng's historical story as an interactive system to experience historical events in the Zheng period. Through the interactive design of immersive experience VR content, through the implementation of VR experience interactive effects, design game-oriented VR interaction, combined with the role-playing role- playing (Role-Playing Game, RPG) and educational content. The 3D model media development work plan is shown in Figure 1. This study develops 3D digital content and plot animation based on Zheng's historical story. And integrate 3D digital content/animation into the VR somatosensory platform developed by VR interactive program development.

In the VR development hot today, the development of Unity3D conforms to the progress of the times, and the launch of the latest collaborative development model effectively improves the overall efficiency of VR development. The resulting cross-platform creative ability and the mode of working together in the VR mode will bring new ways of working for the creation of VR works. Its emergence represents a possibility for the emergence of VR and non-VR accessibility development platforms.

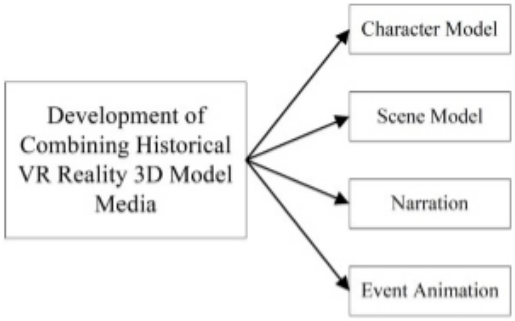


Figure 1 : Delay and Area evaluation of an XOR gate.

IV. RESULT AND DISCUSSION

The VR stereo animation of this study is shown in Figure 2, Figure 3 and Figure 4. Figure 2, 3, 4are the schematic diagrams of the user wearing the VR to view the "Zheng Yihetuan" in the role of a bystander, and taking the event animation of Zheng Yihetuan. Bystanders wearing VR glasses can examine the process of agreement and dialogue between Zheng Yihetuan and the Dutch envoy in the event of the delegation.

Figure 2 : Zheng Yihetuan. (Part 1)

Figure 3 : Zheng Yihetuan .. (Part 2)

Figure 4 : Zheng Yihetuan .. (Part 3)

V. CONCLUSION AND SUGGESTION

VR technology is used in education. Through appropriate gamification or interaction, not only can teachers and students break through the space constraints of traditional classrooms, but through the challenges in the game, students can learn to play physics theory. Abstract concept of chemistry experiment etc. Not only can it reduce the accidents in the physical classroom, but also increase the students' willingness to learn. In this study, we develop a set of VR landscape animation platform, including 3D scene model, character model, prop model and other digital content development. In academic education, this research can cultivate students to become VR ring animation creation talents

through the research and development process. Subsequent research can further improve the virtual and real integration of augmented reality.

The conventional carry select adder performs better in terms of speed. The delay of our proposed design increases lightly because of logic circuit sharing sacrifices the length of parallel path.

However, the proposed area-efficient carry select adder retains partial parallel computation architecture as the conventional carry select adder design; the This research is part of the research and development of the Ministry of Science and Technology (MOST 107-2637-H-366-004). Thanks to the funding subsidy from the Ministry of Science and Technology, this research and development can be carried out smoothly.

REFERENCES

[1] Chan, A., Lau, R. W., & Ng, B. (2001). A hybrid motion prediction method for caching and prefetching in distributed virtual environments. Paper presented at the Proceedings of the ACM symposium on Virtual reality software and technology.

[2] Chan, E. A., Chung, J. W., Wong, T. K., Lien, A. S., & Yang, J. Y. (2007). Application of a virtual reality prototype for pain relief of pediatric burn in Taiwan. Journal of clinical nursing, 16(4), 786-793.

[3] Chen, Q., Gong, P., Guo, R., & Zhang, G. (2016). The Remote Intelligent Virtual Reality Monitoring and Control System for Flower Maintenance Using Internet of Things and Unity3D.

[4] Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney- Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. Computers & Education, 70, 29-40.

[5] Rothbaum, B. O., Hodges, L., Smith, S., Lee, J. H., & Price, L. (2000). A controlled study of virtual reality exposure therapy for the fear of flying. Journal of consulting and Clinical Psychology, 68(6), 1020-1026.

[6] USA Today. (2018). The 100 best animated movies of all time. Retrieved from USA Today: https://www.usatoday.com/story/life/movies/2018/06/12/10 0-best-animated-movies-all-time/696107002/

[7] Wikipedia. (2019, June 23). List of highest-grossing films. Retrieved from Wikipedia, the free encyclopedia: https://en.wikipedia.org/wiki/List_of_highest- grossing_films

Instructions for Authors

Essentials for Publishing in this Journal

1 Submitted articles should not have been previously published or be currently under consideration for publication elsewhere.

2 Conference papers may only be submitted if the paper has been completely re-written (taken to mean more than 50%) and the author has cleared any necessary permission with the copyright owner if it has been previously copyrighted.

3 All our articles are refereed through a double-blind process.

4 All authors must declare they have read and agreed to the content of the submitted article and must sign a declaration correspond to the originality of the article.

Submission Process

All articles for this journal must be submitted using our online submissions system. http://enrichedpub.com/ . Please use the Submit Your Article link in the Author Service area.

Manuscript Guidelines

The instructions to authors about the article preparation for publication in the Manuscripts are submitted online, through the e-Ur (Electronic editing) system, developed by **Enriched Publications Pvt. Ltd**. The article should contain the abstract with keywords, introduction, body, conclusion, references and the summary in English language (without heading and subheading enumeration). The article length should not exceed 16 pages of A4 paper format.

Title

The title should be informative. It is in both Journal's and author's best interest to use terms suitable. For indexing and word search. If there are no such terms in the title, the author is strongly advised to add a subtitle. The title should be given in English as well. The titles precede the abstract and the summary in an appropriate language.

Letterhead Title

The letterhead title is given at a top of each page for easier identification of article copies in an Electronic form in particular. It contains the author's surname and first name initial .article title, journal title and collation (year, volume, and issue, first and last page). The journal and article titles can be given in a shortened form.

Author's Name

Full name(s) of author(s) should be used. It is advisable to give the middle initial. Names are given in their original form.

Contact Details

The postal address or the e-mail address of the author (usually of the first one if there are more Authors) is given in the footnote at the bottom of the first page.

Type of Articles

Classification of articles is a duty of the editorial staff and is of special importance. Referees and the members of the editorial staff, or section editors, can propose a category, but the editor-in-chief has the sole responsibility for their classification. Journal articles are classified as follows:

Scientific articles:

1. Original scientific paper (giving the previously unpublished results of the author's own research based on management methods).

2. Survey paper (giving an original, detailed and critical view of a research problem or an area to which the author has made a contribution visible through his self-citation);

3. Short or preliminary communication (original management paper of full format but of a smaller extent or of a preliminary character);

4. Scientific critique or forum (discussion on a particular scientific topic, based exclusively on management argumentation) and commentaries. Exceptionally, in particular areas, a scientific paper in the Journal can be in a form of a monograph or a critical edition of scientific data (historical, archival, lexicographic, bibliographic, data survey, etc.) which were unknown or hardly accessible for scientific research.

Professional articles:

1. Professional paper (contribution offering experience useful for improvement of professional practice but not necessarily based on scientific methods);
2. Informative contribution (editorial, commentary, etc.);
3. Review (of a book, software, case study, scientific event, etc.)

Language

The article should be in English. The grammar and style of the article should be of good quality. The systematized text should be without abbreviations (except standard ones). All measurements must be in SI units. The sequence of formulae is denoted in Arabic numerals in parentheses on the right-hand side.

Abstract and Summary

An abstract is a concise informative presentation of the article content for fast and accurate Evaluation of its relevance. It is both in the Editorial Office's and the author's best interest for an abstract to contain terms often used for indexing and article search. The abstract describes the purpose of the study and the methods, outlines the findings and state the conclusions. A 100- to 250-Word abstract should be placed between the title and the keywords with the body text to follow. Besides an abstract are advised to have a summary in English, at the end of the article, after the Reference list. The summary should be structured and long up to 1/10 of the article length (it is more extensive than the abstract).

Keywords

Keywords are terms or phrases showing adequately the article content for indexing and search purposes. They should be allocated heaving in mind widely accepted international sources (index, dictionary or thesaurus), such as the Web of Science keyword list for science in general. The higher their usage frequency is the better. Up to 10 keywords immediately follow the abstract and the summary, in respective languages.

Acknowledgements

The name and the number of the project or programmed within which the article was realized is given in a separate note at the bottom of the first page together with the name of the institution which financially supported the project or programmed.

Tables and Illustrations

All the captions should be in the original language as well as in English, together with the texts in illustrations if possible. Tables are typed in the same style as the text and are denoted by numerals at the top. Photographs and drawings, placed appropriately in the text, should be clear, precise and suitable for reproduction. Drawings should be created in Word or Corel.

Citation in the Text

Citation in the text must be uniform. When citing references in the text, use the reference number set in square brackets from the Reference list at the end of the article.

Footnotes

Footnotes are given at the bottom of the page with the text they refer to. They can contain less relevant details, additional explanations or used sources (e.g. scientific material, manuals). They cannot replace the cited literature.
The article should be accompanied with a cover letter with the information about the author(s): surname, middle initial, first name, and citizen personal number, rank, title, e-mail address, and affiliation address, home address including municipality, phone number in the office and at home (or a mobile phone number). The cover letter should state the type of the article and tell which illustrations are original and which are not.