The conventional E-learning systems are user centered with greater diversity of users, complicated with novice unprepared users and make the users feel alone with the limited help from a peer or a teacher. Provision of content dynamically until users familiarize with the concepts and provision of personalized instructions based on individual student abilities or preferences to improve or accelerate his or her performance is the need for an Adaptive Learning System. The primary objective of this research is to develop a framework for conceptual knowledge representation and retrieval of contents based on conceptual search of individual personnel providing Ontology based Adaptive Learning with Personalized teaching contents. This thesis projects two salient approaches for providing adaptive learning and personalized contents. This thesis illustrates a new methodology of constructing concept maps automatically using ontology as a first approach to measure the learners’ understanding for a particular topic; thereby teachers can adopt adaptive teaching and learning based on the learners’ knowledge structures as reflected in the concept maps. The teachers can dynamically revise and deliver instructional materials according to the learners’ current progress. In this approach, dynamic contents are provided to the learners based on a Neuro Fuzzy Ontology Extraction Algorithm. This ontology based tool is effective for tutors to use adaptive teaching methods in providing contents and for learners to improve their learning process.

The main advantage of this new method of adaptive e-learning is to generate a concept map of a learner on a particular topic to update the instructor about the current knowledge level of the learners. The technique involves the process of learner profile creation, study materials distribution and online examination. The first process is to create a learner profile using ontology called Learner Profile Ontology (LPO). The second stage is based on the learner profile, wherein suitable study materials will be provided according to the knowledge level of each learner. To estimate the knowledge
level of the learner on the topic, online examination will be conducted for each learner. The answers obtained as text documents from the learner will undergo many stages to produce concept map. The stages are Text Processing, Dimensionality Reduction, Neuro-Fuzzy logic Score values evaluation of the document to calculate the ability of the learner. Based on this acquired score, the decision is taken to make re-examination or proceed to give the next material. In the concept extraction stage, the concepts will be extracted and used to produce a concept map for every learner. This adaptive e-learning technique provides a pedagogically suitable learning path to learners with minimum interaction of instructors. The instructors are also able to know the current knowledge level of the learners through the automatic generation of concept map derived from the examination results of the learners on each and every topic provided to them.

The second projected approach is to provide Personalized Content. This method presents a personalized ontology model for a learner to learn from the ontological user profiles from both world knowledge base and user local instance repositories. The main objective of this innovative work is to mine the Ontology of the learners to provide personalized content. This novel method applies different procedures such as creation of the learner-profile -ontology, mining the ontology through Inc Span$^+$ algorithm, concept extraction and concept sharing for the provision of personalized contents. Primarily, to create the learner profile, attributes of the learners are entered into the personalized ontology for the construction of e-learning system. In the next stage, the personalized ontology will be creating a knowledgebase for the learner from the local instance repository and the world knowledgebase retrieved from the LCSH (library of Congress Subject Headings). Then the personalized ontology will provide the suitable topics in the form of URL links based on the mining. The process of mining is prepared with Inc Span$^+$ algorithm. The projected method was implemented in the working platform of JAVA and the results were evaluated. The proposed system shows a very
good increase of accuracy on the generation of ontologies by implementing a modified Inc Span+ algorithm which shows better efficiency than the existing Prefix Span algorithm techniques. The limitation of low performance efficacy in the existing system is overcome by generating more number of relevant nodes and accurate connectivity between the nodes with extension. The concept maps are generated with sensitivity value more than 90%, the accuracy and precision values are more than 80%. The proposed adaptive E-learning using Neuro- Fuzzy has shown 25% improvement than Fuzzy and other E-learning methods. Creation of personalized ontology model of the learner in a framework provides personalized content to the learners by mining the personalized model using modified incremental spanning algorithm. On comparing the proposed Inc Span+ algorithm with the existing technique using prefix spanning, it is seen clearly that all the performance measures obtained for the proposed technique using Inc Span+ algorithm has attained better evaluated values than the existing methods using prefix span algorithm. The sensitivity value is more than 95%, precision, accuracy and ontology F-measure values are more than 90%. The results show performance of this algorithm is better than other algorithms to mine the personalized ontology model of the learner to provide personalized content.

This system provides personalized learning path to the learners. Dynamic contents are provided to the learners by creating concept maps. The concept maps can be viewed only by the instructor to monitor them. So the instructors need not waste their time to determine the learner knowledge level and provide content dynamically until user becomes familiar with the content. Creation of personalized ontology model of the learner in a framework provided personalized content to the learners by mining the personalized model using modified incremental spanning algorithm. A modularized architecture has been implemented for realizing an adaptive personalized learning system.