Chapter 2

Concepts and Terminology

2.1 Data Types

We first explain data types used in machine learning. In machine learning, a database has records, where each record is called an *instance*, an *example* or a *sample*. In this book we use the term "instance" for each record. Then the data type of each instance can be categorized into six types: a vector, a set, a sequence (or a string), a tree, a graph and a node in a graph. Below we will explain each type of data. Also we note that currently in real-world applications, each record can have more than one data type at the same time, such as a vector and a node in a graph. We will explain this type of data also after the description on the six data types.

2.1.1 Vector

When each instance has a certain number of values, which in machine learning, are called *features*, *attributes* or *variables*, and in this book we use *features* for values of an instance, where features can be numerical or categorical. Vectors are standard data in machine learning and data mining. Fig. 2.1 shows an illustrative example of vectors (called *feature vectors*) for instances, resulting in a matrix for multiple instances. Here are features, terminology and examples:

Building blocks: are feature values, which can be either discrete or continuous.

Example 1: demographic data: One instance is an individual, where features are age, gender, etc.

Example 2: gene expression: One instance is a gene, and features are experimental conditions, under which expression of the corresponding gene is measured. Each matrix element is the expression value of the corresponding gene and the corresponding experimental condition.

	Feature 1	Feature 2	Feature 3	Feature 4
Instance 1	A	-1.2	Large	0.5
Instance 2	B	1.8	Small	-0.4
Instance 3	B	-0.3	Medium	-0.2
Instance 4	A	1.9	Small	0.3
...				

Figure 2.1: Instances, each being a vector, are a matrix.

Instance 1: $\{A, B, C, D\}$, Instance 2: $\{D, C, B, A\}$

Figure 2.2: Two instances, each being a set.

2.1.2 Set

Each instance is a set, which has features (elements), where the number of features can be different for each instance and features have no order. Entirely a dataset can be a set of sets. Fig. 2.2 shows an illustrative example of sets.

Building blocks: One set has an arbitrary number of elements (features), which can be discrete or continuous. Also elements have no orders. Thus, for example, in Fig. 2.2, {A, B, C, D} and {D, C, B, A} are the same. We can say that a vector is a special case of a set.

Example: market basket: One typical example is a *market basket*, which is a set of items purchased by one customer at, for example, a department store, a convenience store or an E-commerce site. In general the number of items is always very large, while each user buys only a few number of items, which makes the market basket data very *sparse*.

2.1.3 Sequence and String

When elements in one set are ordered, the set becomes a *sequence*. In particular elements are a finite number of letters, such as the alphabet, the sequence is a *string* (see below in some more detail). As well as sets, the length of a sequence is flexible and not fixed.

Thus a sequence is a special case of a set, in the sense that the elements are ordered. Then a vector can be a further special case of a sequence, in the sense that the number of features is fixed. Fig. 2.3 shows an illustrative example of sequences. Below we describe the definition and terminology of sequences.

Discrete element for sequences: Discrete elements of sequences are called *letters* or *characters*. The set of letters is called the *alphabet*. A sequence of letters is called a string.

Instance 1: $DCBA$, Instance 2: $ADBCA$

Figure 2.3: Two instances, each being a sequence.

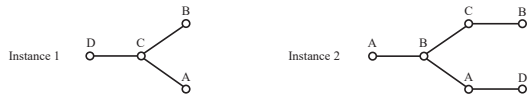

Figure 2.4: Two instances, each being a tree.

Subsequence and substring: A consecutive part of a sequence is called a *subsequence*. Also a consecutive part of a string is called a *substring*. For example, in Instance 1 of Fig. 2.3, DC and DCB are substrings, while DCA, i.e. the first, second and fourth letters, is not a substring.

Example 1: natural language: A typical sequence example is natural languages, which are the main data of computational linguistics, natural language processing and speech recognition, etc., which are classical applications of machine learning.

Example 2: gene/protein sequence: A nucleic acid sequence can be a string of four letters (corresponding to four types of nucleic acids). Similarly an amino acid sequence can be a string of twenty letters (corresponding to twenty amino acids). The length of one sequence/string can be different for both nucleic acid and amino acid sequences.

2.1.4 Tree

Each instance is a tree, and so the input data is a set of trees. Trees can be easily defined if graphs are already defined, and so suppose that graphs are already defined, trees are graphs without any cycling edges (or cycles).

Fig. 2.4 shows illustrative examples of trees, where Instance 1 has a branch from C to B and also to A, and similarly Instance 2 has a branch from B to C and A.

Building blocks: A tree consists of nodes and edges.

Cycles: Trees have no cycles. This discriminates trees from graphs.

Labels: A tree with labels is called a *labeled tree*. For example, in Fig. 2.4, A, B, C and D are labels. In this book, we consider labeled trees.

Root: In general, any node of a tree can be a *root*, while if one node of a tree is fixed as the root, the tree is called a *rooted tree*. For example, D of Instance 1 can be fixed as the root, and A of Instance 2 can be fixed as the root. We focus on rooted trees, and so we consider *labeled rooted trees*.

Leaves and internal nodes: In the rooted tree, except the root, we regard all nodes with only one edge as *leaves*. Nodes except leaves and the root are called *internal nodes*.

Ordered tree: For a rooted tree, nodes can be ordered from the root to leaves, and the tree is an *ordered tree*. Ordered trees are generated by allowing branches in sequences. In other words, sequences are a special case of ordered trees, generated by not allowing any branches.

Parent-children: In the rooted tree, for two nodes connected by an edge, the node closer to the root is called *parent* and the other node is called a *child*. Comparing with sequences, a feature of trees is a parent can have more than one children, while in sequences (and strings), a parent can have only one child.

Siblings, ancestors and descendants: Nodes with the same parent are called *siblings*. For a child, any node between its parent and the root are all *ancestors*. Similarly for a parent, its children and any node between the children and leaves are all *descendants*.

Depth: The number of edges from the root to a node is called the *depth* of the node. Usually the depth of the root is zero. The nodes with the same depth are called nodes at the same *layer*. On the other hand, the number of edges from a leaf is called the *height*. Usually the height of an leaf is zero.

Subtree: We explain regular definition of *subtree* below, while in frequent subtree mining, subtree means any connected part of a tree. Thus this definition in frequent subtree mining is different from the regular definition. In fact the regular definition is based on the definition of subsequence in sequences/strings, while the above definition (any part of a tree) is derived from the definition of subgraphs.

In regular definition, a subtree has some node (of the original tree) as the root (of this subtree) and also all nodes and edges of the leaf side of the root. For example, in Instance 2 of Fig. 2.4, if the root is the most left-hand side A, CB and AD of the most right-hand side can be subtrees, while BAD cannot be a subtree, because if B is specified as the root of a subtree, the subtree must be B(AD)CB.

Example: glycan (carbohydrate sugar chain): Building blocks of glycans are around 10 to 15 types of monosaccharides, which can be letters (labels). Glycan is generated by the connection (binding) of these monosaccharides, and the connection allows branches, resulting in trees with labels of monosaccharides.

2.1.5 Graph

One instance is a graph and input data are a set of graphs. Fig. 2.5 shows illustrative examples of graphs. Comparing with trees, one important feature of

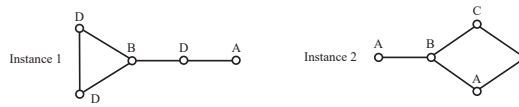

Figure 2.5: Two instances, each being a graph.

graphs is that graphs have cycles. For example, in Instance 1 of Fig. 2.5, two D and B are connected each other in the left-hand side, which turns into a cycle. This is not allowed in a tree, and trees are a special case of graphs.

Building blocks: A graph consists of nodes and edges, which connect nodes.

Degree: The number of edges connecting to one node is called the *degree* of the node.

Complete graph: If all nodes in a graph are connected each other, this graph is called a *complete graph*.

Labels: If nodes in a graph is labeled, this graph is called a *labeled graph*. Instances in Fig. 2.5 are two labeled graphs.

Direction of edges: If edges have some direction, the graph is called a *directed graph*; otherwise, the graph is called an *undirected graph*.

Routes: If one node is reached from another node by using one or more edges, the edges and nodes between the two nodes are entirely called a *route* from one of the two nodes to the other node.

Self-loop and cycles: If one edge connects the same node, this edge is called a *self-loop*. If two different nodes connected by one route are the same node, this route is called a *cycle*. The cycle allows to go from a node to another node by using more than one routes. Again graphs with no cycles are trees, meaning that a tree always has only one route between any two nodes.

Subgraph: A part of a graph is called a *subgraph*. If all nodes and edges are connected each other in a subgraph, the subgraphs is called a *connected subgraph*. We consider only connected subgraphs as subgraphs in this book.

Isomorphism: If two graphs have the same structure in terms of nodes and edge connectivity, they are called *isomorphic*.

Example: chemical structure of chemical compounds: The types of (physical) elements of chemical compounds are limited, such as carbons and oxygens, and they can be labels. Then the chemical structure (called a *molecular graph*) of a chemical compound can be regarded as a labeled graph.

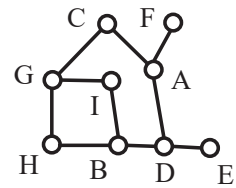

Figure 2.6: Instances are nodes in a graph, which is the entire data.

2.1.6 Node in a Graph

One instance is a node in a graph, and the entire data is a graph (all nodes in one graph is a set of all instances). Fig. 2.6 shows a simple, illustrative example. Nodes are instances, meaning that nodes are all unique (Note that this does not mean that labels of nodes are all different).

Example 1: social network: A social network is a graph with nodes for individuals and edges for some relationship between the individuals connected by the corresponding edges. Note that nodes (individuals or people) are all unique, and they can be assigned by labels, such as a male or a female.

Example 2: gene regulatory network: A gene regulatory network is a collection of molecular-level biological knowledge on gene regulations, such as that gene A is regulated by gene C. Regarding gene regulations as binary relations, i.e. two nodes connected by one edge, a graph with all binary relations of gene regulations is a gene regulatory network, where nodes are all unique genes. Again in this case also, genes can be with labels, such as gene functions.

2.1.7 Multiple Data Types

The last data type is that two or more data types can be given at the same time. For example, we can have a vector and a node in a graph both for each instance. We can just raise a couple of examples for this type of data.

Example 1: sequence and graph: drug-target interactions

An interaction of a drug and a target has both a drug and a target for one instance. A target is a protein, which can be represented by an amino acid sequence[1], while a drug is a small chemical compound, which can be represented by a chemical structure, corresponding to a molecular graph, i.e. a graph. Thus overall each instance of drug-target interactions can be represented by a pair of a sequence and a graph.

[1]If we think that a target is a gene, that can be represented by a nucleic acid sequence.

Example 2: vector and node in a graph: demographic data and social network

Demographic data consists of individuals with their features like age, sex, etc., meaning that each individual is a vector in demographic data. Also instead of demographic data, we can consider purchase data in E-commerce, which is generally a huge matrix of individuals (users) for rows and items (goods) for columns. Thus an instance can be each individual, which has features of purchase records, resulting in a vector for each individual. On the other hand, a social network is a graph with nodes of individuals, meaning that each instance is a node in a graph. Thus, entirely, given demographic data and social network means that each instance is a pair of a vector and a node in a graph.

Example 3: vector and node in a graph: gene expression data and gene network

Gene expression is typical vector data, in which each instance is a gene, which has expression values under multiple experimental conditions as features. On the other hand, we can have a network of genes from a lot of different biological aspects[2], such as gene regulation network, protein-protein interactions, signal processing network and metabolic pathways, etc. All these networks can be a graph with genes as nodes and some relationships between two genes can be an edge, resulting in that each instance is a node of a graph. Thus overall, one instance is a vector and also a node in a graph.

2.2 Machine Learning (ML)

We now briefly describe machine learning, focusing on introducing key terms to be used. Readers, particularly entry-level machine learners, are recommended to go through this chapter without trying to completely understand the terms within this chapter.

2.2.1 Paradigms

As mentioned earlier, data, input of machine learning, are a set of records, each being called an *instance*, *example* or *sample*. We use the "instance" through this book. Each instance has values, which are called*features*, *variables*, *attributes* or *variates*, where these features are visible and unchanged (during learning) and so called *observable variables*. We use "features" among the above four terms.

Occasionally instances can be classified into more than one categories, typically two (binary). Here are two examples:

Example 1: Mobile phone customers of some company can be segmented into at least the following two: *current subscribers* and *former subscribers* (though current subscribers might be categorized into more details, due to the risk

[2]Genes and proteins are synonyms, which can be alternatively used.

of leaving. Also promising subscribers among totally non-subscribers would be also a possible, important category for mobile phone companies).

Example 2: Regarding some disorder, *patients* and *healthy people* (also patients would be categorized into more, due to the seriousness of the disorder).

As such, when instances can be segmented into categories, each category is called a *class*, and each of the above *current subscribers*, *former subscribers*, *patients* and *healthy people*, etc. is called a *label*. The label is the name of a class, and if there are five labels, this means there exist five classes. Here are more examples:

Example 3: A customer is an instance, where the evaluation by one customer against some item is a label. Also another possible label is if a customer buys an item or not, which results in binary labels.

Example 4: A gene is an instance, where its function can be a label.

In Example 3, the evaluation can be binary or some moderate-size number, like a five-stage, while in Example 4, the functions of genes cannot be even by such a small number but a larger number. These two examples imply that labels would not be necessarily assigned to all instances (for example, functions are not necessarily assigned to all genes), implying that assigning labels would be a possible problem setting. More concretely predicting functions of unknown genes is a useful problem setting. This means that a label is a feature value to be predicted in machine learning.

Again all instances do not necessarily have labels, because obtaining labels is expensive. For example, in Example 3, we need to ask customers to give some evaluation against each item. Also we need some biological experiments to annotate functions to genes in life sciences, which needs huge cost and also time.

Thus machine learning has a paradigm which does neither assume classes nor labels. This setting is called *unsupervised learning*. The objective of unsupervised learning is to understand the data *distribution* or more generally to summarize data. A typical approach for summarizing data is *clustering*, where instances are grouped into several *clusters*. Clusters are different from observable variables like features, while variables corresponding to clusters must be trained from given data. Thus this variable corresponding to a cluster is called a *latent variable*. Estimating latent variables means clustering.

On the other hand, we call learning using labels *supervised learning*, where inputs are features of instances. The objective of supervised learning is to estimate a function to predict the label from the given features. This function is called a *hypothesis*, a *model*, a *classifier* or a *predictor*. Note that a model is not only the concept for supervised learning but also for estimating distribution in unsupervised learning. This function has *parameters*, where the values of parameters are trained (learned or estimated) by using input data, and the trained hypothesis is used to predict the labels of unknown instances (or data). The first input data are called *training data* and the second one is called *test data*.

2.2.2 Estimating Parameters: Model Optimization

Estimating a model from given training data means, for example, to keep the values given by the model closest to those of training data. Thus we can set up an *objective function*, for example, in supervised learning, being consistent with the error of the model from training data, i.e. an *error function* or *loss function*. We can then minimize the objective function, which turns into an optimization problem, like minimizing the error function. The optimization in terms of training data only causes overfitting of the model to the training data. In order to avoid the overfitting, the model needs to be generalized, which is called *generalization* or *regularization*. In practice, we add one or more constraints to the objective function, where the constraints are, mathematically, terms, called *regularizers* or *regularization terms*. Thus to solve some problem, we can set up an objective function with regularizers, which we often call problem *formulation*. Usually in machine learning model formulation, model parameters to be estimated are in both the objective function and regularizers. Also model formulation sometimes has *hyperparameters*, which are given arbitrary by users or decided empirically but not trained from input data. For example, in model formulation, the coefficients of regularizers, called *regularization coefficients* are one typical hyperparameter.

Now let's get back to Example 3, where the situation is an E-commerce site. It would not be the case that an customer has bought almost all items in the E-commerce site, while usually most customers bought only just a few goods in the site. Thus the data from E-commerce, i.e. a matrix of users (rows) and items (columns), has only a small number of elements, filled by some values, showing the goods evaluation by customers or just the user purchase history. More concretely the row vectors or users have only a few number of values, with others being *missing information*. This situation of data is called *sparse* data, and interestingly sometimes this data *sparsity* is useful to solve the problem efficiently even if the given matrix is huge.

2.3 Marketing

2.3.1 Definition of Marketing

One short definition[3] of marketing is "meeting needs profitability" [56]. A more realistic way of understanding marketing is that companies, which (produce and) sell good items that people want at low price "turn a private or social need into a profitable business opportunity" [56]. The American Marketing Association gives the following longer, more formal definition: "Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" [1].

There are two different types of definition on marketing: *social* and *managerial* definition [56]. Simply speaking, the latter is more on profitability, while the former is much less on this aspect. Readers might be likely to accept the latter

[3]We will explain several terms to be used for defining "Marketing" later.

Table 2.1: Marketing is not selling.

	Selling	Marketing
Focus	Selling	Customers
Objective	Convert products or services into cash.	Satisfy customer demands in best possible ways.
Strategy	Push: try to sell as much as possible.	Pull: capture customer demands.

definition of marketing more easily from a viewpoint of profitability. We have to point out that marketing is a broader concept than just selling/buying goods, which is only a tip of the marketing iceberg. For example, "the aim of marketing is to know and understand the customer so well that the product or service fits him and sells itself. Ideally, marketing should result in a customer who is ready to buy. All that should be needed then is to make the product or service available [29]." Simply speaking, marketing is a *customer satisfying* process, and not a process of goods producing and selling. Table 2.1 shows a summary of the difference of marketing from selling, in terms of three points: focus, objective and strategy. Regarding the focus, selling just concentrates on selling goods itself, while marketing considers more on customer satisfaction. This affects the objectives of selling and marketing. That is, the objective of selling is again selling more goods, while that of marketing is customer satisfaction, and marketing explores the best way of customer satisfaction.

In strategy, Table 2.1 shows *push* and *pull strategies* for selling and marketing, respectively. The push strategy is a promotional strategy to show the goods/products to the customers more through (for example, sales) advertisements (to take products to customers). On the other hand, the pull strategy is to pull customers in, for example, stores and web pages of the products through more customer-oriented advertisements (to pull customers to the products). The pull marketing focuses on long-term relationships with customers, by creating brand loyalty and keeping customers back, while push marketing focuses on more short-term sales. Fig. 2.7 shows schematic picture of the pull strategy and the push strategy. Again in the push strategy the retailer promotes the goods to customers straightly, while in the pull strategy, the customers are promoted to come to the retailer.

Thus *marketing management* can "view the entire business process as consisting of a tightly integrated effort to discover, create, arouse and satisfy customer needs[4]" [62]. We may then think that the social definition can be a broader idea, including managerial definition, particularly recently, and then the definition of social marketing might be the definition of marketing itself. Here a well-known definition of social marketing is as follows: "Marketing is a societal process by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services of value with others" [56].

[4]Maybe, instead of needs, "demands" would be more appropriate.

(a) Push strategy

(b) Pull strategy

Figure 2.7: Schematic picture of (a) push marketing and (b) pull marketing.

In fact an important point of the recent marketing is that corporates treat the relationships with the society very carefully. So-called *corporate society relationships (CSR)* are now one of the major key roles of companies, and most corporates now have the devision, which is working only for CSR. That is, the companies are very cautious on the reputation, evaluation, and reviews by customers, since they directly affect the company names and brands, and eventually the sales and profits of their goods and services. In summary, now the companies have great concerns with *customer satisfaction*. This is just one aspect of societal marketing, indicating that companies and customers are connected by not only selling/buying goods and services provided by the companies but other many ways.

2.3.2 Markets

There are ten main types of entities, which can be marketed: *goods* (*items*), *services*, *events*, *experiences*, *persons*, *places*, *properties*, *organizations*, *information* and *ideas* [56]. An important point is that the marketed entities are not only goods, but also a wide variety of things which are sometimes physically seen but not necessarily so. Another point is that although there are ten types of different entities raised, we can focus on the two most abundant entities: goods and services, where goods can be seen always, while services are not necessarily.

Markets have marketers, where a *marketer* is someone who seeks a response–attention, a purchase, a vote, a donation–from another party [56]. People in markets are not only marketers, while markets have both *buyers* (or *consumers*) and *sellers* (or *suppliers*), who trade goods and/or services. Typically there are three types of markets: 1) *consumer markets*, where consumable goods and/or services are sold, mainly for individuals, 2) a counterpart is *non-profit* or *government* markets, where services are provided for customers and for example taxes are payed from customers to the non-profit organization, and 3) another coun-

terpart is *manufacturer markets*, in which goods and/or services are traded, but buyers are not individuals but manufacturers, i.e. corporates. Also simply the term "market" is often used for specifying groups of customers in a wide variety of ways, such as foods markets (by products), kids markets (by ages or demographic data) and European markets (by locations) [56].

The physical place of the market, such as a supermarket, is called a *marketplace*, while the digital (or virtual) place of that in internet is called a *marketspace*. The *metamarket* contains both the above two concepts of markets [87, 88].

2.3.3 Marketing Concepts

Terms

We can start with terms to explain customer behaviors for marketing concepts: buyers, one of the two parties in markets, have some motivation to acquire goods or services provided by sellers. These motivation can be classified into three types: *needs*, *wants* and *demands*. Needs are the most basic requirements, such as water, foods, wears and houses, to live. On the other hand, wants are strong needs on specific goods or services. For example, cars are needs to live in the country side for transportation, while wants are on a specific car type, such as sports cars, or a specific car or car manufacturer, like Ferrari or Lamborghini. Demands are wants, where consumers with demands mean those who are able to buy the goods or services of demands, while those with wants are not necessarily able to buy the goods they want. This means that the companies might focus on consumer "demands" more than simpler consumer "wants" and also "needs". Demands of consumers for a product are measured under specified conditions, such as the consistent customer demographic feature, the specific area, etc. The measured demand is called *market demand*. This demand is real, while the estimated demand by the company side is called *company demand*. The accurate company demand (also called *future demand*) is key to success for the company.

Suppliers address to satisfy customer needs and demands. Then they develop *offerings*, which are a combination of goods and services, providing benefits, called *values*, to buyers [82]. The *customer value triad* is an idea of defining the value by a combination of three points: *quality*, *service* and *price*. Of course the value increases with quality and service but decreases with price. Marketing can be thought as creating and delivering the value to customers. *Customer satisfaction* can be a criterion to judge the value in marketing.

Marketing activities can be measured by four points: product, price, promotion and place, which are entirely called *marketing mix* or *4P* [73]. This is a rather classical measurement, and clearly focused on just selling too much. Thus several replacements have been proposed: *4C* (Consumer, Cost, Communication and Convenience) [58], where the idea is that for example, consumers should be weighed more than products, communication with customers can be more important than one-directional promotion (advertisement) and the convenience of buying products should be considered instead of place, since selling places are not important in the internet era. Another example is new 4P (People, Processes,

Programs and Performance) [56].

When we think a so-called "marketing strategy", these 4P are basis for implementing the strategy for market.

Historical Change

Now we see the marketing concepts, being divided into the following five types: production-, product-, selling- and marketing-oriented, and societal marketing concepts. The first three are rather obsolete and the last two are more modern and focused by this book.

1. **Production-oriented concept:** One straightforward idea for selling is to consider the most central people among buyers and supply products or services proper for those averaged people. Then the suppliers just seek the efficiency in time, costs and distribution. The production-oriented concept follows this idea, and also the marketing following this idea has been called *mass marketing*, typical traditional marketing. The main advantage is that this strategy can make production simple, since manufacturers or service providers can just focus on only one or a few products or services, most preferred by the major consumers. However the disadvantage is that the product or service by mass marketing may not necessarily cover a large enough part of consumers.

2. **Products-oriented concept:** The products-oriented concept is based on the idea that consumers must prefer more to the newer, better quality and higher performance. In other words, this concept is derived from only the manufacturer's view, more than the demands of buyers. Research- or technology-oriented companies sometimes make this misunderstanding.

3. **Sales-oriented concept:**
   The sales-oriented concept is similar to the products-oriented concept in the sense that the concept focuses on the needs of the sellers only. However the difference is that the sales-oriented concept focuses on the sellers' needs of converting the products into cash, while the products-oriented concept focused on the product quality and performance. Thus as a result, based on this concept, companies become just aggressive in pushing their sales.

4. **Marketing-oriented concept:** The marketing-oriented concept challenges the above three concepts. In the above three concepts, companies tried to find the right customers for their products. However in the marketing-oriented concept, the companies try to produce the right products for the targeted customers. A representative marketing stranger, based on this concept, is *target marketing*, with the following three steps: 1) *Customer segmentation*: Buyers who have similar preferences in consumption or similar demographic, psychographic and/or behavioral properties can be grouped, since in reality each individual cannot be so distinguished each other and the individuals with such similar properties can be treated together in the

sense of marketing . That is, customers can be divided into a certain number of groups, which are called *market segments*. 2) *Targeting*: then sellers or marketers select the segments promising for their goods or services. This is called *targeting*. 3) Positioning: then sellers develop *offerings* for the targeted segments. This step is called *positioning*.

We will explain target marketing in more detail in Chapter 3.

5. **Societal marketing concept:** As mentioned earlier, marketing has a wider definition than just selling/buying. In particular, one important aspect of marketing is to develop long-term relationships with people in society which will eventually affect the company brands and products. The societal marketing concept indicates this type of modern marketing manner. Also a similar but rather wider concept is *holistic marketing concept*, which has four concepts of marketing: 1) *relationship marketing*, 2) *integrated marketing*, 3) *internal marketing* and 4) *performance marketing* [56].

   The most important one among the above four is 1) relationship marketing, which "aims to build mutually satisfying long-term relationships with key constituents in order to earn and retain their business [37]". A key point of customer relationship management is, being opposite to the classical mass marketing, to identify each customer and then satisfy their needs and demands. This is called *personalized marketing*. We will explain relationship marketing in more detail in Chapter 4.

   We here briefly describe the other three marketing concepts below:

   2) Integrated marketing means that different marketing activities can be assembled together, where they are strategically integrated, not just the sum of them. For example, different advertisements, such as television, radio and web sites, etc. can be integrated into a more efficient and effective way.

   3) Internal marketing means the hiring, orientation, training of company employees to keep/improve customer satisfaction. This marketing focuses on "within" companies.

   4) Performance marketing means considering not only sales profits but also wider indices, such as market share, customer loss rate and customer satisfaction and other measures, which are eventually the evaluation of the company in terms of social responsibility.

Again this book focuses on two marketing strategies: target marketing and relationship marketing, which are derived from the above **4. Marketing-oriented concept** and **5. Societal marketing concept**, respectively. Also we describe target marketing and relationship marketing in detail in Chapters 3 and 4, respectively.

The most important point for the company growth is to discover and foster the competences to boost and protect the company business. These competences are called *core competencies*, which should have the following characteristics [79]: core competencies 1) highly contribute to achieve the customer benefits, 2) can be applied to not only one but many markets and 3) are hard to be imitated.